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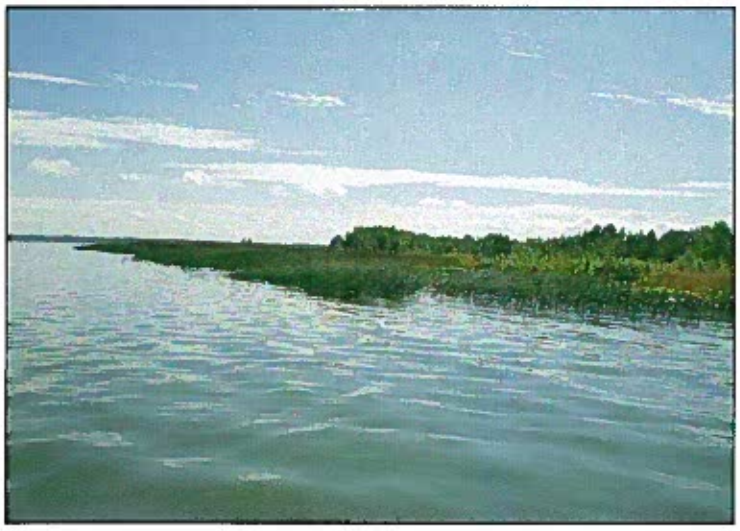
Shoreline and Fish Habitat Assessment

Section 1-041-01-W5M and Portion of
S ½-12-041-01-W5M
Gull Lake, Alberta

Presented to

Ms. Jacqueline Penn
A.D. Williams Engineering Inc.



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LETTER OF TRANSMITTAL

October 14, 2008 Our Project Number: ADWIL-08503-15451.00-0

Ms. Jacqueline Penn
A.D. Williams Engineering Inc.
210, 7240 Johnstone Drive
Red Deer, AB T4P 3Y6

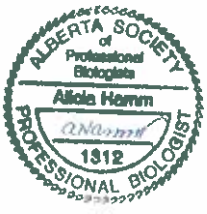
Dear Ms. Penn:

Re: Shoreline and Fish Habitat Assessment
Section 1-041-01-W5M and a Portion of S ½-12-041-01-W5M
Gull Lake, Alberta

We are pleased to present the above referenced shoreline and fish habitat assessment report (Report) for your benefit and use in assessing the environmental integrity of the property known as Section 1-041-01-W5M and a portion of S ½-12-041-01-W5M, Gull Lake, Alberta. This Report is based on field reconnaissance, sediment sampling, water sampling, and a review of relevant literature. This Report conforms to the fish habitat assessment procedures outlined in the Alberta Infrastructure Fish Habitat Manual: Guidelines & Procedures for Watercourse Crossings in Alberta (November 1999).

The opinions expressed in this Report are solely those of Ecomark Ltd. This Report is furnished in our capacity as consultants to A.D. Williams Engineering Inc. (Client) for the project described in this Report and do not necessarily reflect the viewpoint of the Client. The Report is written for the benefit and use of the Client, Frank Wilson, Lacombe County, Alberta Environment, Alberta Sustainable Resource Development, and Fisheries and Oceans Canada (Parties) and may only be relied upon by the Client and Parties in connection with the shoreline and fish habitat assessment. Conditions assessed are valid to the date of visual assessment and limited by the information that was shared by the third parties involved. Liability is limited to the invoiced amount for the Report. While every effort was made to confirm that the data collected from third parties is factual, complete and accurate, Ecomark Ltd. makes no guarantees or warranties whatsoever with respect to such data.

Yours sincerely,



Alicia Hamm, P. Biol. Professional Seal

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1 INTRODUCTION

1.1 Need for Project

At the request of Ms. Jacqueline Penn of A.D. Williams Engineering Inc., Ecomark Ltd. was retained to perform a shoreline and fish habitat assessment of Section 1-041-01-W5M and a portion of S ½-12-041-01-W5M, Gull Lake, Alberta (Site).

The purpose of the assessment, as stated in the July 8, 2008 letter from Lacombe County, is to conduct a detailed fish habitat inventory and fish use survey of all portions of the shoreline adjacent to the Site and to determine its susceptibility to erosion from the proposed development. The assessment includes proposed mitigation measures to prevent "harmful alteration, disruption or destruction of fish habitat" (HADD) and recommends compensation measures, if required.

The proposed development consists of an 18-hole public golf course, driving range, pro-shop, restaurant, 2200 Bare Land Condo Lots, and 194 daily rental lots along with an inland marina, boat launches, and a public beach and picnic area.

1.2 Project Location

The Site is situated along the western shoreline of Gull Lake approximately 6 kilometers northeast of Bentley, Alberta. Gull Lake is a large, shallow, mesotrophic (medium nutrient) lake located approximately 13 kilometers west of Lacombe, Alberta. Due to its proximity to both Calgary and Edmonton, Gull Lake is a popular recreational destination.

The Site is approximately 300.9 hectares (743.6 acres) and primarily consists of cultivated agricultural land in upland areas, mature mixedwood forest on slopes, and young deciduous forest and sedge meadows in low-lying areas. Sandy Point is a small rocky peninsula that extends into Gull Lake at the northeast corner of the Site. Emergent aquatic vegetation is primarily found along the shoreline at the southern half of the shoreline. Biological and physical features of the Site are described in detail in the biophysical assessment conducted by Ecomark Ltd. in 2008.

2 METHODS

The methods used in the assessment conform to the applicable fish habitat assessment procedures outlined in Section 4.0 of the Alberta Infrastructure Fish Habitat Manual (November 1999). The assessment was conducted along all portions of the shoreline adjacent to the Site. Twenty sampling locations were marked along the shoreline at water depths ranging from 0.35 to 0.72 meters. The sampling locations are shown in Figure 1.

The composition of riparian vegetation, aquatic macrophytes, and streambed substrate (i.e. fines, small gravel, large gravels, cobbles, and boulders) was determined at each sampling location. Wildlife and fish observations were also recorded. Sediment samples were obtained along each sampling location using a gravity corer. Sediment lithology was noted and sediment samples were placed in clean, plastic bags provided

by Bodycote Testing Group. Sediment samples were sent to the laboratory and analyzed for total organic carbon (analysis code CL31) and texture (percent sand, silt, clay) by hydrometer (analysis code PS1).

Water samples were obtained at five sampling locations along the shoreline and measured in the field for pH, electrical conductivity, dissolved oxygen, water temperature, and turbidity using a calibrated WTW Multi 3400i multi-meter and Chemetrics I-4300 turbidity meter. Water samples were obtained using clean plastic containers provided by Bodycote Testing Group. Appropriate preservatives were applied and water samples were analyzed for total organic carbon (analysis code TOC), total suspended solids (analysis code TSS), and turbidity (analysis code TURB).

3 RESULTS

3.1 Shoreline Characteristics

The field inspection identified three predominate habitat units along the shoreline of the Site: the east-facing shoreline in the eastern portion of the Site, Sandy Point in the northeastern corner of the site, and the north-facing shoreline in the northern portion of the Site. The shoreline characteristics, sediment textures, and water quality data are summarized in Appendix 1 and described in the following sections.

3.1.1 East-Facing Shoreline

The east-facing shoreline is located along the eastern portion of the Site and includes sampling locations T-01 to T-13. This area is situated in a bay protected from the northwest prevailing winds and natural wave action. The predominate sediment types along this section are fines consisting of organics, sand, silt, and clay. The area most susceptible to erosion in this section is found on sandy sediments between sampling location T-10 and T-13.

Dense bands of emergent aquatic vegetation consisting of common great bulrush (*Scirpus lacustris spp. validus*) and common cattail (*Typha latifolia*) and beds of aquatic macrophytes including pondweed (*Potamogeton* spp.), northern watermilfoil (*Myriphyllum exalbescens*), and flat-leaved bladderwort (*Utricularia intermedia*) are found at the southern half of the section from sampling locations T-01 to T-09. The presence of emergent vegetation and aquatic macrophytes decrease near sampling locations T-10 to T-13 and blue-green algae becomes the dominant aquatic vegetation along the shoreline.

Sedge meadows dominate the riparian areas in the southern half of the Site. Vegetative species include common great bulrush (*Scirpus lacustris spp. validus*), water sedge (*Carex aquatilis*), green sedge (*Carex viridula*), fowl manna grass (*Glyceria striata*), marsh reed grass (*Calamagrostis canadensis*), and Arctic rush (*Juncus baltica*). The groundwater table is near the surface and drainage is poor. The riparian areas along the northern half of this section consist of young deciduous forest vegetation of balsam poplar (*Populus balsamifera*), willow (*Salix* spp.), marsh reed grass (*Calamagrostis canadensis*), and brome grass (*Bromus* spp.).

The southern half of the Site offered high quality habitat for waterfowl, shorebirds, and blackbirds. Mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), northern pintail (*Anas acuta*), solitary sandpiper (*Tringa solitaria*), spotted sandpiper (*Actitis macularius*), Franklin's gull (*Larus pipixcan*), ring-billed gull (*Larus*

delawarensis), common tern (*Sterna hirundo*), black tern (*Chlidonias niger*), red-winged blackbird (*Agelaius phoeniceus*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*) were all detected near the dense bands of emergent aquatic vegetation along the shoreline of the Site. There were also abundant minnow-sized fish and juvenile fish (species unknown) that were detected in these areas at the time of inspection.

Water quality parameters were measured in the field at sampling location T-02, T-05, and T-10 at depths ranging from 0.58 to 0.60 meters. Water pH was measured from 9.1 to 9.07 and water temperature ranged from 21.2 to 23.0 degrees Celsius. Turbidity ranged from 1.14 FTU to 5.22 FTU and dissolved oxygen ranged from 10.58 to 11.31 milligrams per liter. Electrical conductivity ranged from 1254 to 1263 micro-Siemens per centimeter. The laboratory results indicate total suspended solids ranged from 7 to 43 milligrams per liter and turbidity ranged from 4.2 to 11.5 NTU in this area. Total organic carbon ranged from 19.9 to 20.6 milligrams per liter.

3.1.2 Sandy Point

Sandy Point is a small rocky peninsula that extends into Gull Lake at the northeast corner of the Site and includes sampling locations T-14 and T-15. The predominant sediment type along this section includes small gravels, large gravels, cobbles, and boulders with some fines (i.e. sand) in interspaces. No emergent or submergent aquatic macrophytes were detected along Sandy Point.

The riparian area of Sandy Point primarily consisted of vegetation adapted to rocky disturbed habitats such as white sweet clover (*Melilotus officinalis*), hybrid clover (*Trifolium hybridum*), Canada thistle (*Cirsium arvense*), and stinging nettle (*Urtica dioica*). Balsam poplar (*Populus balsamifera*), willow (*Salix* spp.), wolf willow (*Elaeagnus commutata*), gooseberry (*Ribes* spp.), Canada buffaloberry (*Shepherdia canadensis*), wild strawberry (*Fragaria virginiana*), yarrow (*Achillea millefolium*), and common dandelion (*Taraxacum officinale*) were detected in a more forested area near T-15.

Red-winged blackbird (*Agelaius phoeniceus*) and killdeer (*Charadrius vociferus*) were detected near Sandy Point at the time of inspection. No other wildlife was observed.

Water quality parameters were measured in the field at T-14 at a depth of 0.73 meters. Water pH was measured at 9.02 and temperature was recorded at 21.1 degrees Celsius. Turbidity was measured at 15.25 and dissolved oxygen was measured at 8.55 milligrams per liter. Electrical conductivity was measured at 1254 micro-Siemens per centimeter. The laboratory results measured total suspended solids at 4 milligrams per liter and turbidity at 4.8 NTU. Total organic carbon was measured at 20.8 milligrams per liter.

3.1.3 North-Facing Shoreline

The north-facing shoreline is located at the northern boundary of the subject property and includes sampling locations T-16 to T-20. Prevailing winds originate from the northwest in summer resulting in strong winds and wave action along this section. The predominant substrate in this section is small gravels, large gravels, and cobbles with fines (i.e. sand) in interspaces. No sediment samples could be obtained at T-16 due to the density of cobbles and boulders at this sampling location.

Common great bulrush (*Scirpus lacustris spp. validus*) was the only type of emergent aquatic vegetation observed along this section and was of relatively low stature throughout, except at sampling location T-16. Sparse beds of northern watermilfoil (*Myriphyllum exalbescens*) were observed near sampling location T-18.

Young deciduous forest and sedge meadow dominate the riparian areas along this section. Balsam poplar (*Populus balsamifera*), willow (*Salix* spp.), wolf willow (*Elaeagnus commutata*), wild strawberry (*Fragaria virginiana*), white sweet clover (*Melilotus officinalis*), hybrid clover (*Trifolium hybridum*), yarrow (*Achillea millefolium*), Canada thistle (*Cirsium arvense*), common dandelion (*Taraxacum officinale*), perennial sow thistle (*Sonchus arvensis*), Philadelphia fleabane (*Erigeron philadelphicus*), foxtail barley (*Hordeum jubatum*), common plantain (*Plantago major*), water sedge (*Carex aquatilis*), green sedge (*Carex viridula*), fowl manna grass (*Glyceria striata*), marsh reed grass (*Calamagrostis canadensis*), Arctic rush (*Juncus baltica*), and seaside arrow grass (*Triglochin maritima*) were observed along the riparian areas.

The rocky shoreline provided habitat for American white pelican (*Pelecanus erythrorhynchos*) near sampling location T-16. American crow (*Corvus brachyrhynchos*) was also observed in this area of the Site. No other wildlife was detected.

Water quality parameters were measured in the field at T-19 at a depth of 0.20 meters. Water pH was measured at 8.98 and temperature was recorded at 21.5 degrees Celsius. Turbidity was measured at 28.10 and dissolved oxygen was measured at 8.72 milligrams per liter. Electrical conductivity was measured at 1252 micro-Siemens per centimeter. The laboratory results measured total suspended solids at 3 milligrams per liter and turbidity at 1.8 NTU. Total organic carbon was measured at 22.4 milligrams per liter.

3.2 Fish Community

The provincial Fish and Wildlife Management Information System (FWMIS) was requested to report fish occurrence data for Gull Lake. Based on a FWMIS occurrence records and a review of relevant literature, there are nine fish species reported in Gull Lake (Cooper, 2008, Email Comm; Atlas of Alberta Lakes, 2008).

Table 1: Fish Community in Gull Lake

Common Name	Scientific Name	Provincial Status	Federal Status
Brook stickleback	*Culaea inconstans*	Secure	Not at Risk
Burbot	*Lota lota*	Secure	Not at Risk
Iowa Darter	*Etheostoma exile*	Secure	Not at Risk
Lake Whitefish	*Coregonus clupeaformis*	Secure	Not at Risk
Northern Pike	*Esox lucius*	Secure	Not at Risk
Spottail Shiner	*Notropis hudsonius*	Secure	Not at Risk
Walleye	*Stizostedion vitreum*	Secure	Not at Risk
White Sucker	*Catostomus commersoni*	Secure	Not at Risk
Yellow Perch	*Perca flavescens*	Secure	Not at Risk

Brook stickleback (*Culaea inconstans*) inhabit all habitat types including ponds, creeks, saline sloughs, rivers, and lake edges. The species typically occupy area with abundant aquatic vegetation. The species are spring spawners that spawn from mid-May to mid-July, in areas with aquatic vegetation. The species build oval shaped nests with aquatic vegetation and its own kidney secretions. Brook Sticklebacks eat aquatic invertebrates, fish larvae, very small fish eggs, and juvenile fish (Joynt and Sullivan, 2003).

Burbot (*Lota lota*) is a cod fish that inhabit rocky shorelines and sandy bottoms in lakes. The species are winter spawners that spawn under ice. Groups of fish gather together and simultaneously release eggs and milt over sand and gravel. Juvenile fish are found along rocky shorelines and in tiny rivers near large lakes and rivers. The species feed on fish, whitefish eggs, mollusks, crustaceans, and aquatic insects (Joynt and Sullivan, 2003).

Iowa darter (*Etheostoma exile*) is a miniature perch fish that inhabits clear waters in lakes and rivers. The species spawn in spring (May to June) in shallow areas with emergent aquatic vegetation. The species are benthic and pelagic and feed on aquatic invertebrates, insect larvae and plankton (Joynt and Sullivan, 2003).

Lake whitefish (*Coregonus clupeaformis*) is a benthic fish that inhabit lakes at depth. The species are fall spawners that spawn over gravelly and sandy shoals of large lakes. The species is a benthic feeder that feeds on larval insects, snails, clams, fish eggs, and small fishes (Joynt and Sullivan, 2003). The species was transplanted to Gull Lake from Pigeon Lake in the 1970's (O'Leary *et al.*, 1995). Sandy Point has been identified as the only spawning site for this species on the west side of Gull Lake (Lacombe County, 2008).

Northern pike (*Esox lucius*) is a sought-after sport fish in Gull Lake that inhabits shallow waters with aquatic vegetation. The species is an early spring spawner that prefers heavily vegetated shallow waters and flooded areas for spawning. Eggs are released during spawning and attach to nearby aquatic vegetation. The species is carnivorous and feeds on small fish, birds, rodents, and amphibians. Previous fish surveys indicate that the species were most abundant at the north end of the lake where aquatic macrophytes were abundant (O'Leary *et al.*, 1995).

Spottail shiner (*Notropis hudsonius*) is an important prey species that inhabits clean rivers, streams, and lakes. The species spawn over sand and gravel in lakes and feed on plankton, aquatic and surface insects, algae, fish eggs, and larvae (Joynt and Sullivan, 2003).

Walleye (*Stizostedion vitreum*) is an important sport fish in Alberta that inhabits large rivers and dark, deep lakes. The species spawns in spring (April to May) over rocky shallow shoals in lakes. The species feed on small fish and occasionally insects (Joynt and Sullivan, 2003). The species was stocked in Gull Lake in 1987, 1988, and 1989 to enhance the natural population. Previous fish surveys indicate that the species is most abundant along the east side of Gull Lake near Wilson's Beach (O'Leary *et al.*, 1995).

White sucker (*Catostomus commersoni*) inhabits all habitat types ranging from cold streams to warm lakes and clean to turbid waters. The species spawns in spring (May to July) over gravels in shallow lakeshores or tributaries. The species are bottom feeders that feed on mollusks, crustaceans, insect larvae, and algae (Joynt and Sullivan, 2003).

Yellow perch (*Perca flavescens*) inhabits vegetated shallows of lakes. The species are early spring spawners that spawn immediately following ice breakup in shallow, sheltered vegetated areas. The species feeds on small fish larvae, small fish, crayfish, leeches, mollusks, and invertebrates (Joynt and Sullivan, 2003). The species was stocked in Gull Lake in 1975 and 1977. Populations of this species in Gull Lake are low and do not appear to be well established (O'Leary *et al.*, 1995).

4 DISCUSSION

4.1 Evaluation of Fish Habitat

Basic habitat requirements for fish include food, cover, reproduction, and water quality. Fish habitat along the shoreline is evaluated based on shoreline characteristics and fish community.

The east-facing shoreline along the southeastern boundary of the Site consists of dense bands of emergent vegetation, beds of aquatic macrophytes and fine substrates along its southern half. This section of shoreline likely provides high quality spawning habitat for northern pike (*Esox lucius*), yellow perch (*Perca flavescens*), and brook stickleback (*Culaea inconstans*). Emergent vegetation and aquatic macrophytes provide suitable cover habitat for eggs and likely provides high quality rearing and feeding habitat for spottail shiner (*Notropis hudsonius*) and juvenile fish. Numerous fry were detected among the beds of aquatic macrophytes at the time of inspection.

The northern half of this section was situated in a shallow bay immediately south of Sandy Point. The amount of emergent and submergent aquatic vegetation decreased in comparison to the southern half of the shoreline. The shoreline predominately consisted of fine substrate (i.e. sand). Numerous spottail shiners (*Notropis hudsonius*) and fry were detected in this section using blue-green algae for cover. This section likely provides high quality spawning habitat for burbot (*Lota lota*), spottail shiner (*Notropis hudsonius*) and yellow perch (*Perca flavescens*) and high quality rearing habitat for juvenile fish.

Sandy Point and the north-facing shoreline primarily consisted of gravels, cobbles, and boulder with fines (i.e. sand) in interspaces. These sections likely provide high quality spawning habitat for lake whitefish (*Coregonus clupeaformis*), walleye (*Stizostedion vitreum*), and white sucker (*Catostomus commersoni*) and provide suitable rearing habitat for burbot (*Lota lota*). White sucker (*Catostomus commersoni*) was detected along the north-facing shoreline at the time of inspection.

4.2 Potential Impacts to Fish and Fish Habitat

Lakeside developments may potentially impact fish and fish habitat through release of sediment and toxic substances and removal of fish habitat through construction of marinas, boat launches, and beaches. A 30-meter buffer designated as Environmental Reserve (ER) is intended to mitigate potential impacts.

Turbid water can be very harmful to fish and fish habitat. Sediment can result in fish mortality in extreme cases, but more often impacts fish behavior. Fish experience greater stress, gill damage, greater cardiac output, reduced respiratory function, and a greater susceptibility to disease when turbidity is greater than 20 FTU. Increased turbidity also reduces the ability of fish to visually detect prey and predators, which can result in lower consumption rates, lower growth rates, greater feeding activity, and greater predation risk. Turbid

waters will also impact the ability of aquatic vegetation to grow and will negatively impact invertebrate populations at levels over 10 FTU (Robertson *et al.*, 2006). It is essential to maintain surface water quality during development of the Site to prevent negative impacts to fish.

Construction of a marina, boat launch, and beach will remove sections of fish habitat along the shoreline. Emergent aquatic vegetation, submergent aquatic macrophytes, and fine substrates will be removed during construction of the ingress and egress of the marina. Beach development will also remove riparian vegetation, emergent aquatic vegetation, submergent aquatic macrophytes, and substrates along the shoreline. Fish habitat that is removed for development of the subject property will be compensated for, pursuant to the *Fisheries Act*.

5 MITIGATION MEASURES

Section 35 (2) of the *Fisheries Act* prohibits HADD unless authorized by the Minister of Fisheries and Oceans. Potential causes of HADD from the proposed development are listed in Table 2. The proposed mitigation measures to combat HADD are described in the subsequent sections.

Table 2: Mitigation Summary Table

Potential Cause of HADD	Mitigation Measure
Out of stream site preparation resulting in release of sediment.	• Construction practices (Section 5.1) • Sediment and erosion control plan (Section 5.3) • Monitoring (Section 5.6)
Out of stream site preparation resulting in release of toxic substances during construction.	• Construction practices (Section 5.1) • Monitoring (Section 5.6) • Contingency plan (Section 5.7)
In-stream work resulting in release of sediment.	• Construction practices (Section 5.1) • Sediment and erosion control plan (Section 5.3)
Fish passage during construction.	• Timing restrictions (Section 5.4) • Fish transfer (Section 5.5)
Construction of a marina.	• Development design (Section 5.2)
Beach development.	• Development design (Section (5.2)
Loss of fish habitat.	• Compensation (Section 6)

5.1 Construction Practices

The following best management practices can be used to prevent adverse effects on fish and fish habitat during construction:

- Plan the project so that the amount of in-water work is kept to a minimum. Conduct dry land excavations for as long as possible. If possible, plan in-water work to occur as a single event.
- If equipment must enter the lakebed, use an in-water pad constructed of washed gravel where equipment would generate excess sediment.
- Ensure machinery arrives onsite clean and free of fluid leaks.
- Ensure equipment leaves clean to reduce disease transfer.
- Store toxic materials (i.e. fuel, lubricants, hydraulic fuel, etc.) and refuel equipment at least 100 meters from the lake.
- Use environmentally friendly products in equipment operating in the lake.
- Begin reclamation and site cleanup as soon as construction is completed.

5.2 Development Design

The proposed development will encompass environmental principles in light of the ecological values of Gull Lake and its shoreline. The proposed beach development will be located at the central portion of the east-facing shoreline in a naturally sandy area. The proposed beach development will not be situated on public land. Beach volleyball courts, picnic areas, change rooms, and bathroom facilities will be situated in upland areas away from the beach water interface.

Alberta Sustainable Resource Development has claimed all areas immediately east of the fifth meridian as public land. These areas include Sandy Point at the northeast corner of the Site and an area immediately south of the proposed beach development. All public lands will be restricted to walking access only. No motorized vehicles will be permitted along the shoreline between these two areas to promote ecological contiguity and maintain existing riparian vegetation. Pedestrians will be encouraged to stay on marked trails through appropriate signage.

The proposed marina is situated in a naturally sheltered bay. The proposed marina location is not strongly influenced by the northwest prevailing winds. The egress (exit) and ingress (entry) to the proposed marina will follow shoreline contours instead of being constructed perpendicular to the shore. This design feature will reduce visual impact and reduce dredging frequency, as sandbars will likely not develop as quickly. Dredging of the egress and ingress channels is only expected to occur once every ten years, depending on shoal build-up. Any sand material excavated during construction or dredging activities will be relocated to the beach development.

The egress will be at the north end and the ingress will be at the south end of the proposed marina to avoid stagnant water within the marina. Piers will be designed to allow maximum sunlight penetration and promote good flow-through of water. Boating traffic will be one-way, running south to north to reduce the size of the navigation channel and improve boat safety.

Dry slips (dry stack storage) will be used to stack boats, reducing the number of boats floating in the lake and reducing the amount of bilge water. Docks will be constructed with environmentally appropriate materials.

The docks will consist of a floating dock system and will be secured to bottom substrates by anchor. Marina parking, vessel storage, and boat maintenance will be situated away from the water's edge. The amount of pavement in parking areas and roadways will be minimized. Fueling activities will be conducted in designated areas only. The proposed marina will provide appealing visuals.

Wherever possible, emergent vegetation and submergent aquatic macrophytes will be maintained along the shoreline, except in areas near the proposed beach development and the channel leading to the ingress and egress of the proposed marina. The existing emergent aquatic vegetation will provide erosion control and maintain ecological integrity of the shoreline. The navigation channels will have buoyed navigational markings and boat speed restrictions through the sections of emergent aquatic vegetation. Slope into the marina will be gradual.

Stormwater from the proposed development including parking areas and roadways adjoining the marina will not be allowed to drain directly to the proposed marina or beach development. All developed areas will drain inland to stormwater management facilities before release into the lake.

5.3 Sediment and Erosion Control Plan

An in-water silt barrier will be installed around the construction site to isolate disturbed, turbid areas during construction. The in-water silt barrier will consist of a geotextile fabric attached to stakes, with a weighted sleeve at the bottom of the fabric to seal against the lakebed. The barrier will extend at least 0.30 meters above the water level. The in-water silt barrier will be removed only after sediment has had time to settle.

A series of silt fences will be installed in upland areas to prevent sediment from entering the lake. The silt fences will extend 0.5 meters above the ground surface and will be placed at least 2 meters apart. The silt fences will be angled slightly uphill to collect runoff water. Silt fences will be inspected weekly to ensure that they are functioning effectively. Sediment will be removed from the silt fences if sediment accumulates to 0.2 meters. Near the water's edge, coconut matting or equivalent biodegradable matting with impregnated native seeds and a quick catch of sterile fall rye (or equivalent) will be installed.

Erosion control matting will be placed in areas where slopes exceed 3:1 and along the disturbed lakebed. All other disturbed areas will be seeded with a sterile cover crop of sterile fall rye (or equivalent) and a wet meadow seed mix naturalized to the Central Parkland subregion of Alberta.

5.4 Timing Restrictions

Based on the fish community, critical spawning periods for fish that inhabit Gull Lake include spring, fall, and winter. Valuable sport fish and prey fish like northern pike (*Esox lucius*), walleye (*Stizostedion vitreum*), white sucker (*Catostomus commersoni*), yellow perch (*Perca flavescens*), spottail shiner (*Notropis hudsonius*), brook stickleback (*Culaea inconstans*), and Iowa darter (*Etheostoma exile*) are spring spawners, whereas lake whitefish (*Coregonus clupeaformis*) are fall spawners. Burbot (*Lota lota*) are known to spawn in winter under ice cover. For these reasons, no construction or dredging activities should occur during critical spawning

periods. Excavation of the inland portions of the marina will take place during winter and any in-water construction and dredging activities will be limited between July 15 and September 1, where possible.

5.5 Fish Transfer Around Construction Site

Following installation of the in-water silt barrier and prior to construction and dredging activities, fish will be netted and placed outside the work area. Fish movement outside the work area will not be restricted.

5.6 Monitoring During Construction

A Qualified Aquatic Environmental Specialist (QAES) will be onsite to monitor water quality during construction and dredging activities. Confirmatory samples will be sent to the laboratory and analyzed for total suspended solids, total dissolved solids, and turbidity. A post-construction monitoring report will be prepared and submitted to Fisheries and Oceans Canada following construction activities.

5.7 Contingency Plan

In the unforeseen event of high water levels or a heavy rain event, construction will cease until water levels have subsided.

Spill kits will be available onsite to respond to a release of potentially toxic materials. If safe to do so, all spills in and around the construction site will be cleaned up and reported to Alberta Environment 24-hour spill reporting line: 1-800-222-6514.

6 COMPENSATION MEASURES

Removal of fish habitat is considered a HADD and is subject to compensation under the *Fisheries Act*. The mitigation measures described above will significantly reduce the amount of HADD. The areas that are subject to compensation are limited to the egress and ingress channels in to the proposed marina and the proposed beach development. The approximate area of impacted fish habitat is 105,487 m^2.

To compensate for the residual HADD from the proposed development, all gravel and cobble excavated on Site will be used to build an alternative lake whitefish (*Coregonus clupeaformis*) spawning area off of the public lands area south of Sandy Point. Clean washed cobbles and boulders will supplement any additional substrates that are required to enhance the spawning area.

7 SUMMARY

The shoreline and fish habitat assessment identified three habitat types along the shoreline near the Site. The habitat types include: the east-facing shoreline, Sandy Point, and the north-facing shoreline. The east-facing shoreline predominately consisted of fine substrates, dense bands of emergent aquatic vegetation, and beds of submergent aquatic macrophytes. The east-facing shoreline likely provides high quality spawning habitat for northern pike (*Esox lucius*), yellow perch (*Perca flavescens*), burbot (*Lota lota*), spottail shiner (*Notropis hudsonius*), and brook stickleback (*Culaea inconstans*). The section of shoreline also provides high quality habitat for juvenile fish.

The north-facing shoreline and Sandy Point predominately consisted of small gravels, large gravels, cobbles, and boulders with some fines (i.e. sand) in interspaces, with little emergent aquatic vegetation or submerged aquatic macrophytes. The north-facing shoreline and Sandy Point likely provides high quality spawning habitat for lake whitefish (*Coregonus clupeaformis*), walleye (*Stizostedion vitreum*), and white sucker (*Catostomus commersoni*) and provide suitable rearing habitat for burbot (*Lota lota*).

The proposed development has the potential to impact fish and fish habitat through release of sediment and toxic substances into Gull Lake during development and removal of fish habitat through construction of a marina, boat launch, and beach. The proposed mitigation measures will significantly reduce the amount of HADD caused by the proposed development. To compensate for residual HADD from the proposed development, gravel and cobbles will be placed off of the public lands area south of Sandy Point to build an alternative lake whitefish (*Coregonus clupeaformis*) spawning habitat.

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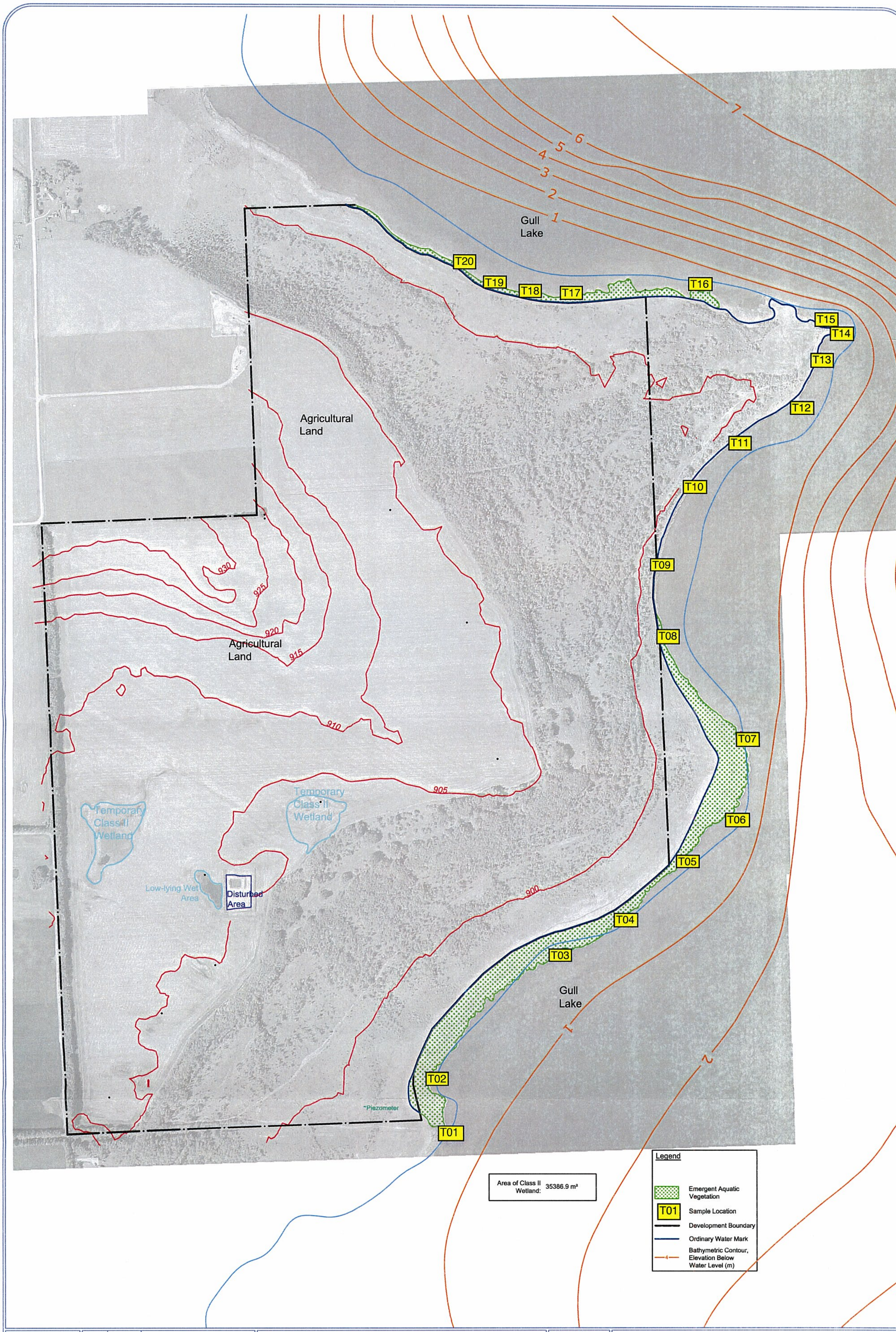


REV #	DATE:	DESCRIPTION
1.0	2008-08-01	DRAFT FOR REVIEW
2.0	2008-08-07	ADDED AND CALCULATED WETLAND AREAS
3.0	2008-09-08	MINOR CHANGES

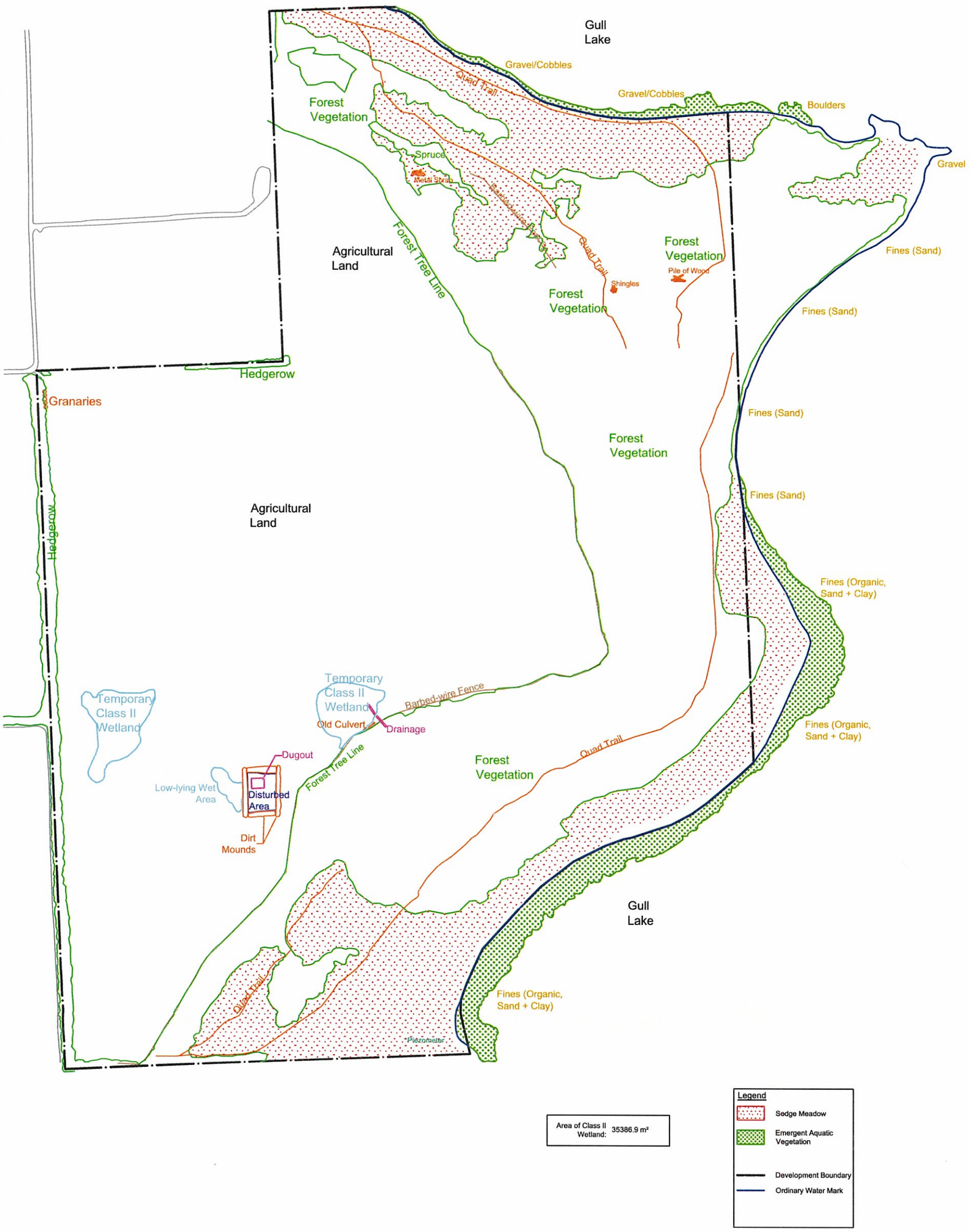
SITE PLAN WITH SAMPLING LOCATIONS
1-41-01-W5M & S½-12-41-01-W5M
Gull Lake, AB

DRAWN BY: HY,CL
REVIEWED BY: AH
APPROVED BY: AH

ECOMARK

PROJECT: ADWIL-08503-15451.00-0
DATE: 2008-09-08
DWG NAME: ADWIL-0850x-15451.00-0_SP1_d-hy-5

REV 3.0
FIG 1



REV #	DATE:	DESCRIPTION
1.0	2008-08-01	DRAFT FOR REVIEW
2.0	2008-08-07	ADDED AND CALCULATED WETLAND AREAS
3.0	2008-09-08	MINOR CHANGES

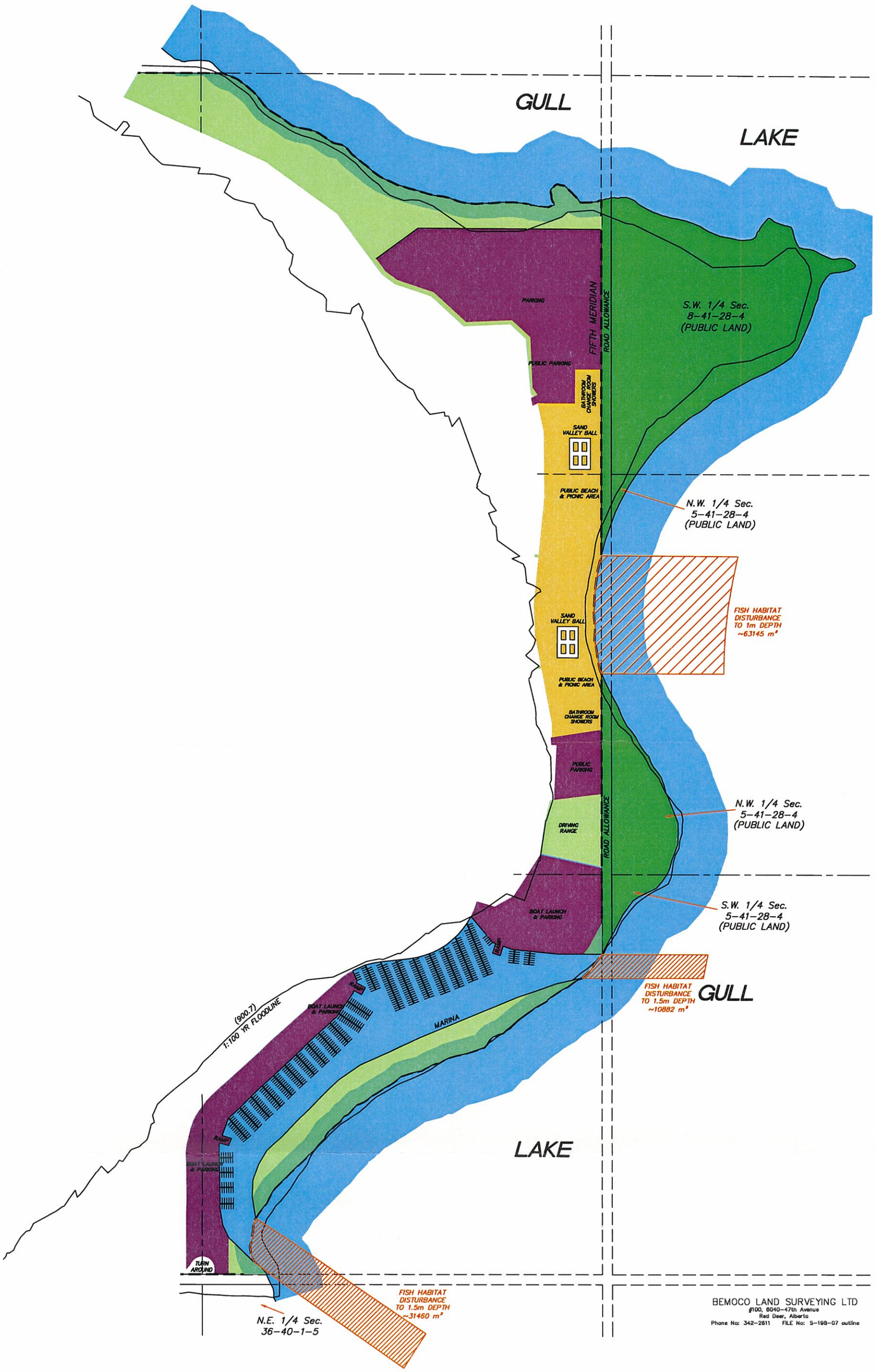
VEGETATIVE FEATURES AND SEDIMENT TYPES
1-41-01-W5M & S½-12-41-01-W5M
Gull Lake, AB

DRAWN BY: HY
REVIEWED BY: AH
APPROVED BY: AH

ECOMARK

PROJECT: ADWIL-08503-15451.00-0
DATE: 2008-09-08
DWG NAME: ADWIL-0850x-15451.00-0_SP1_d-hy-5

REV 3.0
FIG 2



REV #	DATE:	DESCRIPTION
1.0	2007-11-08	DRAFT FOR REVIEW

CONCEPT SHORELINE PLAN, SHOWING AREAS OF EXPECTED FISH HABITAT DISTURBANCE

GULL LAKE, AB

BASE DRAWING FROM BEMOCO LAND SURVEYING LTD.
CONCEPT PLAN MODIFIED FROM A.D. WILLIAMS

DRAWN BY: CL
REVIEWED BY: AH
APPROVED BY: AH

ECOMARK
Suite 100, 14454 - 121 A Avenue NW, Edmonton AB T5V 1A3 P: (780) 444-0506
Suite 205, 838 - 11 Avenue SW, Calgary AB T2R 0E2 P: (403) 410-3463
F: 1-866-337-8631 E: ecomark@ecomarkenv.com W: www.ecomarkenv.com

PROJECT: ADWIL-08503-00-0
DATE: 2008-08-08
DWG NAME: ADWIL-08503-15451.00-0_SP2_d-cl-1.dwg

REV 1.0
FIG 3

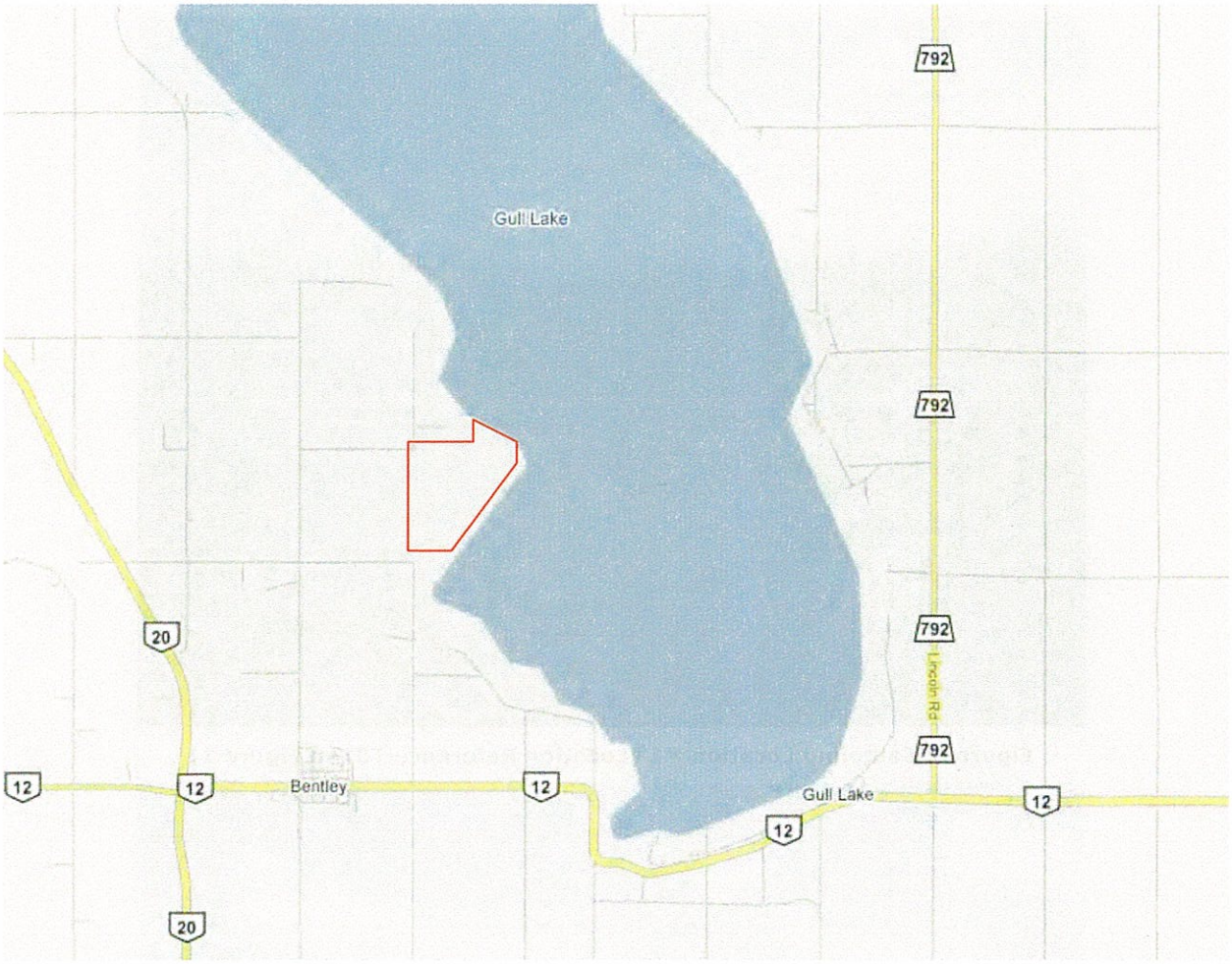


Figure 4: Map of Area (Google Maps, 2008)

Figure 5: Sampling Location #1 (Location Reference T01 in Figure 1)

Figure 6: Sampling Location #2 (Location Reference T02)

Figure 7: Sampling Location #3 (Location Reference T03)

Figure 8: Sampling Location #4 (Location Reference T04)

Figure 9: Sampling Location #5 (Location Reference T05)

Figure 10: Sampling Location #6 (Location Reference T06)

Figure 11: Sampling Location #7 (Location Reference T07)

Figure 12: Sampling Location #8 (Location Reference T08)

Figure 13: Sampling Location #9 (Location Reference T09)

Figure 14: Sampling Location #10 (Location Reference T10)

Figure 15: Sampling Location #11 (Location Reference T11)

Figure 16: Sampling Location #12 (Location Reference T12)

Figure 17: Sampling Location #13 (Location Reference T13)

Figure 18: Sampling Location #14 (Location Reference T14)

Figure 19: Sampling Location #15 (Location Reference T15)

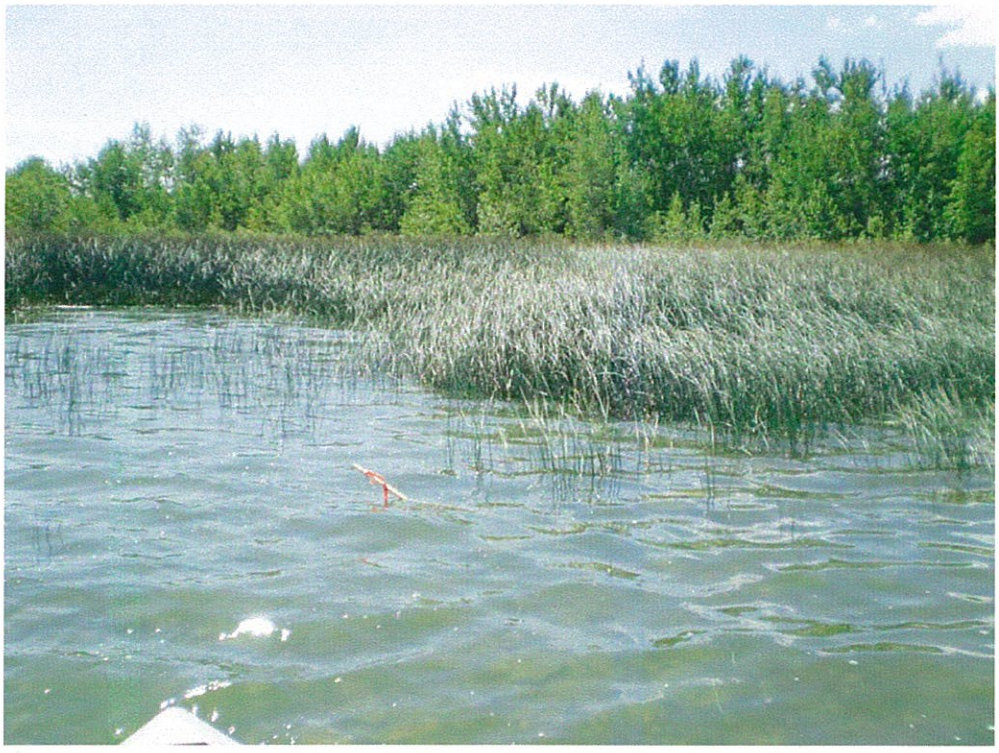


Figure 20: Sampling Location #16 (Location Reference T16)

Figure 21: Sampling Location #17 (Location Reference T17)

Figure 22: Sampling Location #18 (Location Reference T18)

Figure 23: Sampling Location #19 (Location Reference T19)

Figure 24: Sampling Location #20 (Location Reference T20)

Appendix 1: Field Data and Summary of Laboratory Results

Table A1.1: Summary of Shoreline Characteristics

Sampling Location	Sediment Type	Aquatic Vegetation	Riparian Vegetation	Observed Wildlife
T-01	Fines (i.e. clay)	Common great bulrush, common cattail, pondweed, northern watermilfoil, coontail, flat-leaved bladderwort	Common great bulrush, Arctic rush, water sedge, green sedge, fowl manna grass, marsh reed grass	Red-winged blackbird, yellow-headed blackbird, solitary sandpiper, mallard
T-02	Fines (i.e. silty clay)	Common great bulrush, common cattail, pondweed, northern watermilfoil, coontail, flat-leaved bladderwort	Common great bulrush, Arctic rush, water sedge, green sedge, fowl manna grass, marsh reed grass	Red-winged blackbird, yellow-headed blackbird, solitary sandpiper
T-03	Fines (i.e. silty clay, sand)	Common great bulrush, common cattail, northern watermilfoil	Common great bulrush, Arctic rush, water sedge, green sedge, fowl manna grass, marsh reed grass	Red-winged blackbird, yellow-headed blackbird, solitary sandpiper
T-04	Fines (i.e. organic, sand, clay)	Common great bulrush, northern watermilfoil	Common great bulrush, Arctic rush, water sedge, green sedge, fowl manna grass, marsh reed grass	Red-winged blackbird, yellow-headed blackbird
T-05	Fines (i.e. sand, clay)	Common great bulrush, common cattail, northern watermilfoil	Balsam poplar, willow, common great bulrush, Arctic rush, water sedge, green sedge, fowl manna grass, marsh reed grass	Red-winged blackbird, yellow-headed blackbird, solitary sandpiper, blue-winged teal, northern pintail
T-06	Fines (i.e. sand, silty clay)	Common great bulrush, common cattail, pondweed	Balsam poplar, willow, common great bulrush, Arctic rush, water sedge, green sedge, fowl manna grass, marsh reed grass	Red-winged blackbird, yellow-headed blackbird, solitary sandpiper spotted sandpiper
T-07	Fines (i.e. sand, clay)	Common great bulrush, common cattail	Common great bulrush, Arctic rush, water sedge, green sedge, fowl manna grass, marsh reed grass	Yellow-headed blackbird, solitary sandpiper, Franklin's gull, ring-billed gull, common tern, black tern
T-08	Fines (i.e. sand)	Common great bulrush, pondweed	Arctic rush, Canada buffaloberry, yarrow, hybrid clover, Canada anemone, fowl manna grass, northern reed grass	Yellow-headed blackbird, solitary sandpiper, Franklin's gull, ring-billed gull, common tern, black tern
T-09	Fines (i.e. sand)	Common great bulrush, pondweed, flat-leaved bladderwort	Arctic rush, Canada buffaloberry, yarrow, hybrid clover, Canada anemone, fowl manna grass, northern reed grass	Yellow-headed blackbird, spottail shiner
T-10	Fines (i.e. sand)	Common great bulrush, common cattail, blue-green algae	Balsam poplar, willow, brome grass, marsh reed grass	Yellow-headed blackbird, solitary sandpiper, Franklin's gull, ring-billed gull,

Sampling Location	Sediment Type	Aquatic Vegetation	Riparian Vegetation	Observed Wildlife
				common tern, black tern
T-11	Fines (i.e. sand)	Common great bulrush, blue-green algae	Balsam poplar, willow, brome grass	--
T-12	Fines (i.e. sand, blue clay)	Common great bulrush, northern watermilfoil, blue-green algae	Common great bulrush, marsh reed grass, northern reed grass, foxtail barley, yarrow, Philadelphia fleabane	Yellow-headed blackbird, solitary sandpiper, Franklin's gull, ring-billed gull, common tern, black tern
T-13	Fines (i.e. sand)	Pondweed, northern watermilfoil	White sweet clover, northern reed grass, hybrid clover	--
T-14	Fines (i.e. sand), Small Gravels, Large Gravel, & Cobbles	--	White sweet clover, Canada thistle, stinging nettle	Red-winged blackbird, killdeer
T-15	Cobbles & Boulders	--	Balsam poplar, willow, gooseberry, Canada buffaloberry, wolf willow, white sweet clover, wild strawberry, yarrow, common dandelion	-
T-16	Cobbles & Boulders	Common great bulrush, common cattail	Balsam poplar, willow, brome grass	American pelican, American crow
T-17	Fines (i.e. sand), Large Gravel & Cobbles	Common great bulrush (few)	Common great bulrush, northern reed grass, foxtail barley, yarrow, wolf willow, fowl manna grass, wild strawberry, Canada thistle, green sedge, perennial sow thistle	--
T-18	Fines (i.e. sand), Large Gravel, & Cobbles	Northern watermilfoil	Water sedge, marsh reed grass, foxtail barely, wild strawberry, Canada thistle, common plantain	--
T-19	Fines (i.e. sand), Large Gravel, Cobbles & Boulders	Common great bulrush	Common great bulrush, Arctic rush, water sedge, green sedge, fowl manna grass, marsh reed grass, seaside arrow-grass	--
T-20	Fines (i.e. organic, sand), Large Gravel & Cobbles	Common great bulrush	Willow, foxtail barely, green sedge, sweet white clover, Canada anemone, wild strawberry, yarrow, wolf willow, Arctic rush	White sucker

Table A1.2 Sediment Samples Laboratory Results

Sampling Location	Total Organic Carbon (%)	Particle Size		
		Sand (% by weight)	Silt (% by weight)	Clay (% by weight)
T-01	0.56	76	14	10
T-02	2.44	53.4	36.4	10.2
T-03	3.44	23.3	66	10.7
T-04	1.11	69	25.4	5.6
T-05	0.44	69.4	18.6	12
T-06	0.17	89	9.4	1.6
T-07	0.33	80.6	9	10.4
T-08	0.17	96	2.6	1.4
T-09	0.17	91.4	7	1.6
T-10	0.22	99	0.8	0.2
T-11	0.17	98	1.8	0.2
T-12	0.27	84	8	8
T-13	0.67	74.6	14.2	11.2
T-14	0.78	81	16	3
T-15	0.44	51.4	32.8	15.8
T-16	--	--	--	--
T-17	0.39	54	30.2	15.8
T-18	0.33	62.6	25.6	11.8
T-19	0.44	48	31.8	20.2
T-20	0.44	49	31	20

Table A1.3 Water Quality Field Testing

Sampling Location	Water Depth (m)	Turbidity (FTU)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	EC (µS/cm)
T-02	0.60	1.14	9.1	22.8	10.58	1254
T-05	0.58	4.22	9.07	23	11.31	1262
T-10	0.58	5.22	9.01	21.2	10.74	1263
T-14	0.73	15.25	9.02	21.1	8.55	1254
T-19	0.52	28.1	8.98	21.5	8.72	1252

Table A1.4 Water Quality Laboratory Results

Sampling Location	Water Depth (m)	Total Organic Carbon (mg/L)	Total Suspended Solids (mg/L)	Turbidity (FTU)
T-02	0.60	19.9	43	11.5
T-05	0.58	20.6	22	7.7
T-10	0.58	20.2	7	4.2
T-14	0.73	20.8	4	4.8
T-19	0.2	22.4	3	1.8

Appendix 2: Laboratory Results and QA/QC Report

Bodycote

LOT: 632515 COC

2515

Control Number L 005263

Sample Information Sheet

NOTE: Proper completion of this form is required in order to proceed with analysis
See reverse for your nearest Bodycote location and proper sampling protocol

Billing Address:

Company: Ecomark Ltd.
Address: 100, 14964 121A Avenue
Edmonton AB T5V 1A3
QA/QC Report ☐
Attention: Alicia Hamm
Phone: (780) 444-0706
Fax: 1-866-337-8631
Cell:
e-mail: ahamm@ecomarkenv.com

Report Results:
Fax ☐ Mail ☑ Courier ☐ e-mail ☑ e-Service ☑

Copy of Report To: **Copy of Invoice:** ☑

Company: Ecomark Ltd.
Address: 200, 6381 11 Ave SW
Calgary, AB T2R 0E2
Mail Invoice to this address for approval ☐
Attention: Alicia Hamm
Phone: (403) 410-3867
Fax: 1-866-337-8631
Cell: (403) 923-7101
e-mail: ahamm@ecomarkenv.com

Report Results:
Fax ☐ Mail ☐ Courier ☐ e-mail ☑ e-Service ☑

Information to be included on Report and Invoice

Project ID: ADWIL-08503-15451.0-0
Project Name: Fish Habitat Assessment
Project Location: Gull Lake
Legal Location: 1-41-1-W5M
PO#:
Proj. Acct. Code:
Agreement ID:

Rush Please contact the laboratory to confirm rush dates and times before submitting samples.

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All analysis ☐ or As indicated ☐
Date Required:
Signature:
Bodycote Authorization:

Sample Custody (Please Print)
Sampled by:
Company Ecomark Signature AHamm
I authorize Bodycote to proceed with the work indicated on this form:
Date: 24-Jul-08 Initial: CDN
Received by: Chloe Sample Temp. °C
Waybill # Hand Date
Company Brg-C Time JUL 24 '08 12:11

Special Instructions / Comments

Please see Ecomark Ltd. agreement ID.

FOR LAB USE ONLY
Condition of containers / coolers upon arrival at lab

☐ Check here if Bodycote is required to report results directly to a regulatory body (Please include contact information)

☐ Check here if you're testing POTABLE WATER for **HUMAN CONSUMPTION.**

Please indicate which regulations you are required to meet:

	Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers	CL31	PSI	TOC	TURB	TSS	Enter tests above (✓ relevant samples below)
1	TRAN 08-1	Gull Lake	-	23-Jul-08	Soil	Grab	1	✓	✓				
2	TRAN 08-2	"	-	"	"	"	1	✓	✓				
3	TRAN 08-3	"	-	"	"	"	1	✓	✓				
4	TRAN 08-4	"	-	"	"	"	1	✓	✓				
5	TRAN 08-5	"	-	"	"	"	1	✓	✓				
6	TRAN 08-6	"	-	"	"	"	1	✓	✓				
7	TRAN 08-7	"	-	"	"	"	1	✓	✓				
8	TRAN 08-8	"	-	"	"	"	1	✓	✓				
9	TRAN 08-9	"	-	"	"	"	1	✓	✓				
10	TRAN 08-10	"	-	"	"	"	1	✓	✓				
11	TRAN 08-11	"	-	"	"	"	1	✓	✓				
12	TRAN 08-12	"	-	"	"	"	1	✓	✓				
13	TRAN 08-13	"	-	"	"	"	1	✓	✓				
14	TRAN 08-14	"	-	"	"	"	1	✓	✓				
15	TRAN 08-15	"	-	"	"	"	1	✓	✓				

NOTE: All hazardous samples must be labeled according to WHMIS guidelines.

Form No. 0006 (Rev. 04/07)

Bodycote TESTING GROUP 632515

Control Number L 005262

Sample Information Sheet

NOTE: Proper completion of this form is required in order to proceed with analysis
See reverse for your nearest Bodycote location and proper sampling protocol

Billing Address:	**Copy of Report To:** Copy of Invoice: ☑
Company: Ecomark Ltd	Company: Ecomark Ltd. Mail Invoice to this address for approval ☐
Address: 100, 14964 121A Ave QA/QC Report ☑ Edmonton, AB T5V 1A3	Address: 200, 638 11 Ave SW Calgary, AB T2R 0E2
Report Results:	Report Results:
Attention: Alicia Hamm Fax ☐	Attention: Alicia Hamm Fax ☐
Phone: Mail ☑	Phone: 403-410-3867 Mail ☐
Fax: Courier ☐	Fax: 1-866-337-8631 Courier ☐
Cell: e-mail ☑	Cell: 403-923-7101 e-mail ☑
e-mail: ahamm@ecomarkenv.com e-Service ☑	e-mail: ahamm@ecomarkenv.com e-Service ☑

Information to be included on Report and Invoice

Project ID: ADWIL-08503-15451.0-0
Project Name: Fish Habitat Assessment
Project Location: Gull Lake
Legal Location: 1-41-1-W5M
PO#:
Proj. Acct. Code:
Agreement ID:

Rush Please contact the laboratory to confirm rush dates and times before submitting samples.

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All analysis ☐ or As indicated ☐

Date Required: _____
Signature: _____
Bodycote Authorization: _____

Sample Custody (Please Print)
Sampled by:
Company Ecomark Signature AN

I authorize Bodycote to proceed with the work indicated on this form:
Date: 24-Jul-08 Initial: AN

Received by: Sample Temp. °C
Waybill # Date
Company JUL 24'08 12:27 Time

Special Instructions / Comments

Please see Ecomark Ltd. agreement ID.

FOR LAB USE ONLY
Condition of containers / coolers upon arrival at lab

☐ Check here if Bodycote is required to report results directly to a regulatory body (Please include contact information)

☐ Check here if you're testing POTABLE WATER for **HUMAN CONSUMPTION.**

Please indicate which regulations you are required to meet: _____

		Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers	CL3	PS	TOC	TURB	TSS	Enter tests above (✓ relevant samples below)
16	1	TRAN 08-17	Gull Lake	-	23-Jul-08	Soil	Grab	1	✓	✓				
17	2	TRAN 08-18	"	-	"	"	"	1	✓	✓				
18	3	TRAN 08-19	"	-	"	"	"	1	✓	✓				
19	4	TRAN 08-20	"	-	"	"	"	1	✓	✓				
	5			-										
20	6	WS 08-01	Gull Lake	-	22-Jul-08	Water	Grab	2			✓	✓	✓	
21	7	WS 08-02	"	-	"	"	"	2			✓	✓	✓	
22	8	WS 08-03	"	-	"	"	"	2			✓	✓	✓	
23	9	WS 08-04	"	-	"	"	"	2			✓	✓	✓	
24	10	WS 08-05	"	-	"	"	"	2			✓	✓	✓	
	11			-										
	12			-										
	13			-										
	14			-										
	15			-										

NOTE: All hazardous samples must be labeled according to WHMIS guidelines.

Form No. 0006 (Rev. 04/07)

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

		Reference Number	632515-1	632515-2	632515-3	
		Sample Date	Jul 23, 2008	Jul 23, 2008	Jul 23, 2008	
		Sample Location	Gull Lake	Gull Lake	Gull Lake	
		Sample Description	Gull Lake / TRAN 08 -1	Gull Lake / TRAN 08 -2	Gull Lake / TRAN 08 -3	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Sandy Loam	Sandy Loam	Silt Loam	
Sand	50 μm - 2 mm	% by weight	76.0	53.4	23.3	
Silt	2 μm - 50 μm	% by weight	14.0	36.4	66.0	
Clay	<2 μm	% by weight	10.0	10.2	10.7	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

		Reference Number	632515-4	632515-5	632515-6	
		Sample Date	Jul 23, 2008	Jul 23, 2008	Jul 23, 2008	
		Sample Location	Gull Lake	Gull Lake	Gull Lake	
		Sample Description	Gull Lake / TRAN 08 -4	Gull Lake / TRAN 08 -5	Gull Lake / TRAN 08 -6	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Sandy Loam	Sandy Loam	Sand	
Sand	50 μm - 2 mm	% by weight	69.0	69.4	89.0	
Silt	2 μm - 50 μm	% by weight	25.4	18.6	9.4	
Clay	<2 μm	% by weight	5.6	12.0	1.6	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:	
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment
	Edmonton, AB, Canada	Location:	Gull Lake
	T5V 1A3	LSD:	1-41-1 W5M
Attn:	Alicia Hamm	P.O.:	
Sampled By:		Acct code:	
Company:	Ecomark		

Lot ID:	**632515**
Control Number:	L 005263
Date Received:	Jul 24, 2008
Date Reported:	Aug 11, 2008
Report Number:	1137701

		Reference Number	632515-7	632515-8	632515-9	
		Sample Date	Jul 23, 2008	Jul 23, 2008	Jul 23, 2008	
		Sample Location	Gull Lake	Gull Lake	Gull Lake	
		Sample Description	Gull Lake / TRAN 08 -7	Gull Lake / TRAN 08 -8	Gull Lake / TRAN 08 -9	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Loamy Sand	Sand	Sand	
Sand	50 μm - 2 mm	% by weight	80.6	96.0	91.4	
Silt	2 μm - 50 μm	% by weight	9.0	2.6	7.0	
Clay	<2 μm	% by weight	10.4	1.4	1.6	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

		Reference Number	632515-10	632515-11	632515-12	
		Sample Date	Jul 23, 2008	Jul 23, 2008	Jul 23, 2008	
		Sample Location	Gull Lake	Gull Lake	Gull Lake	
		Sample Description	Gull Lake / TRAN 08 -10	Gull Lake / TRAN 08 -11	Gull Lake / TRAN 08 -12	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Sand	Sand	Loamy Sand	
Sand	50 μm - 2 mm	% by weight	99.0	98.0	84.0	
Silt	2 μm - 50 μm	% by weight	0.8	1.8	8.0	
Clay	<2 μm	% by weight	0.2	0.2	8.0	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

			Reference Number	632515-13	632515-14	632515-15	
			Sample Date	Jul 23, 2008	Jul 23, 2008	Jul 23, 2008	
			Sample Location	Gull Lake	Gull Lake	Gull Lake	
			Sample Description	Gull Lake / TRAN 08 -13	Gull Lake / TRAN 08 -14	Gull Lake / TRAN 08 -15	
			Matrix	Soil	Soil	Soil	
Analyte		**Units**		**Results**	**Results**	**Results**	Nominal Detection Limit
Physical and Aggregate Properties							
Texture				Sandy Loam	Loamy Sand	Loam	
Sand	50 μm - 2 mm	% by weight		74.6	81.0	51.4	
Silt	2 μm - 50 μm	% by weight		14.2	16.0	32.8	
Clay	<2 μm	% by weight		11.2	3.0	15.8	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

		Reference Number	632515-16	632515-17	632515-18	
		Sample Date	Jul 23, 2008	Jul 23, 2008	Jul 23, 2008	
		Sample Location	Gull Lake	Gull Lake	Gull Lake	
		Sample Description	Gull Lake / TRAN 08 -17	Gull Lake / TRAN 08 -18	Gull Lake / TRAN 08 -19	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Sandy Loam	Sandy Loam	Loam	
Sand	50 μm - 2 mm	% by weight	54.0	62.6	48.0	
Silt	2 μm - 50 μm	% by weight	30.2	25.6	31.8	
Clay	<2 μm	% by weight	15.8	11.8	20.2	

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:	
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment
	Edmonton, AB, Canada	Location:	Gull Lake
	T5V 1A3	LSD:	1-41-1 W5M
Attn:	Alicia Hamm	P.O.:	
Sampled By:		Acct code:	
Company:	Ecomark		

Lot ID:	**632515**
Control Number:	L 005263
Date Received:	Jul 24, 2008
Date Reported:	Aug 11, 2008
Report Number:	1137701

Reference Number			632515-19	632515-20	632515-21
Sample Date			Jul 23, 2008	Jul 22, 2008	Jul 22, 2008
Sample Location			Gull Lake	Gull Lake	Gull Lake
Sample Description			Gull Lake / TRAN 08 -20	Gull Lake / WS 08-01	Gull Lake / WS 08-02
Matrix			Soil	Water	Water
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Physical and Aggregate Properties						
Turbidity		NTU		11.5	7.7	0.1
Solids	Total Suspended	mg/L		43	22	1
Texture			Loam			
Sand	50 μm - 2 mm	% by weight	49.0			
Silt	2 μm - 50 μm	% by weight	31.0			
Clay	<2 μm	% by weight	20.0			

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

			Reference Number	632515-20	632515-21	632515-22	
			Sample Date	Jul 22, 2008	Jul 22, 2008	Jul 22, 2008	
			Sample Location	Gull Lake	Gull Lake	Gull Lake	
			Sample Description	Gull Lake / WS 08-01	Gull Lake / WS 08-02	Gull Lake / WS 08-03	
			Matrix	Water	Water	Water	
Analyte		**Units**		**Results**	**Results**	**Results**	Nominal Detection Limit
Inorganic Nonmetallic Parameters							
Organic Carbon	Total Nonpurgeable	mg/L		19.9	20.6	20.2	0.5

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:	
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment
	Edmonton, AB, Canada	Location:	Gull Lake
	T5V 1A3	LSD:	1-41-1 W5M
Attn:	Alicia Hamm	P.O.:	
Sampled By:		Acct code:	
Company:	Ecomark		

Lot ID:	**632515**
Control Number:	L 005263
Date Received:	Jul 24, 2008
Date Reported:	Aug 11, 2008
Report Number:	1137701

Reference Number		632515-22	632515-23	632515-24
Sample Date		Jul 22, 2008	Jul 22, 2008	Jul 22, 2008
Sample Location		Gull Lake	Gull Lake	Gull Lake
Sample Description		Gull Lake / WS 08-03	Gull Lake / WS 08-04	Gull Lake / WS 08-05
Matrix		Water	Water	Water

Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Physical and Aggregate Properties						
Turbidity		NTU	4.2	4.8	1.8	0.1
Solids	Total Suspended	mg/L	7	4	3	1

Bodycote TESTING GROUP

Analytical Report

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

			Reference Number	632515-23	632515-24		
			Sample Date	Jul 22, 2008	Jul 22, 2008		
			Sample Location	Gull Lake	Gull Lake		
			Sample Description	Gull Lake / WS 08-04	Gull Lake / WS 08-05		
			Matrix	Water	Water		
Analyte			**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Inorganic Nonmetallic Parameters							
Organic Carbon	Total Nonpurgeable		mg/L	20.8	22.4		0.5

Approved by:

Anthony Neumann, MSc
Laboratory Operations Manager

Bodycote TESTING GROUP

Quality Control

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

Inorganic Nonmetallic Parameters

Blanks		Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Organic Carbon		mg/L	<0.5	-0.0	-0.7	0.6	yes
Material Used:	Method Blank						
Date Acquired:	July 28, 2008						
Acquired By:	Darren Crichton						

Replicates		Units	Replicate1	Replicate2	% RSD Criteria	Absolute Criteria	Passed QC
Organic Carbon		mg/L	27.0	26.7	10.0	1.0	yes
Material Used:	Duplicate						
Date Acquired:	July 28, 2008						
Acquired By:	Darren Crichton						

Control Sample		Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Organic Carbon		mg/L	116	119.0	102.1	135.9	yes
Material Used:	Water High						
Date Acquired:	July 28, 2008						
Acquired By:	Darren Crichton						
Organic Carbon		mg/L	14.6	15.1	13.4	16.8	yes
Material Used:	Water Low						
Date Acquired:	July 28, 2008						
Acquired By:	Darren Crichton						
Organic Carbon		mg/L	3.3	3.1	2.4	3.8	yes
Material Used:	Water Trace						
Date Acquired:	July 28, 2008						
Acquired By:	Darren Crichton						

Physical and Aggregate Properties

Blanks		Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Turbidity		NTU	<0.1	0.1	-0.0	0.2	yes
Material Used:	Method Blank						
Date Acquired:	July 28, 2008						
Acquired By:	Kitty Wong						
Turbidity		NTU	<0.1	0.1	0.1	0.1	yes
Material Used:	Straylight Standard						
Date Acquired:	July 28, 2008						
Acquired By:	Kitty Wong						

Replicates		Units	Replicate1	Replicate2	% RSD Criteria	Absolute Criteria	Passed QC
Turbidity		NTU	7.5	7.5	10.0	0.2	yes
Solids		mg/L	24	26	10	15	yes
Material Used:	Duplicate						
Date Acquired:	July 29, 2008						
Acquired By:	Eman Ismaeel						

Control Sample	Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC

Bodycote TESTING GROUP

Quality Control

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

Physical and Aggregate Properties - Continued

Control Sample	Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Sand	% by weight	31.4	34.2	29.7	38.7	yes
Silt	% by weight	43.4	39.7	35.2	44.2	yes
Clay	% by weight	25.2	26.1	21.6	30.6	yes
<50 um	% by weight	68.6	0.000	0.000	0.000	yes
Material Used:	2007 Farmsoil Standard					
Date Acquired:	July 25, 2008					
Acquired By:	Holly Fairbairn					
Turbidity	NTU	2250	2262.5	2232.5	2292.5	yes
Material Used:	Turbidity High					
Date Acquired:	July 28, 2008					
Acquired By:	Kitty Wong					
Turbidity	NTU	8170	8260.1	7957.1	8563.1	yes
Material Used:	Turbidity Ultra High					
Date Acquired:	July 28, 2008					
Acquired By:	Kitty Wong					
Turbidity	NTU	176	175.3	173.8	176.8	yes
Solids	mg/L	198	196	184	208	yes
Material Used:	Water High					
Date Acquired:	July 29, 2008					
Acquired By:	Eman Ismaeel					
Turbidity	NTU	15.6	15.7	15.2	16.2	yes
Solids	mg/L	17	20	16	24	yes
Material Used:	Water Low					
Date Acquired:	July 29, 2008					
Acquired By:	Eman Ismaeel					
Turbidity	NTU	1.6	1.6	1.6	1.6	yes
Material Used:	Water Trace					
Date Acquired:	July 28, 2008					
Acquired By:	Kitty Wong					

Bodycote TESTING GROUP

Methodology and Notes

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**632515**
Report To:	Ecomark Ltd.	ID:	ADWIL-08503-15451.0-0	Control Number:	L 005263
	100, 14964 - 121 A Avenue	Name:	Fish Habitat Assessment	Date Received:	Jul 24, 2008
	Edmonton, AB, Canada	Location:	Gull Lake	Date Reported:	Aug 11, 2008
	T5V 1A3	LSD:	1-41-1 W5M	Report Number:	1137701
Attn:	Alicia Hamm	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark				

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Carbon Organic (Total) in water (TOC)	APHA		High-Temperature Combustion Method, 5310 B	28-Jul-08	BTG Edmonton
Particle Size Analysis - GS	Carter	*	Hydrometer Method, 55.3	29-Jul-08	BTG Edmonton
Solids Suspended (Total, Fixed and Volatile)	APHA	*	Total Suspended Solids Dried at 103-105'C, 2540 D	29-Jul-08	BTG Edmonton
Turbidity in Water	APHA	*	Nephelometric Method, 2130 B	28-Jul-08	BTG Edmonton

** Bodycote method(s) based on reference method*

References

APHA	Standard Methods for the Examination of Water and Wastewater
Carter	Soil Sampling and Methods of Analysis

Comments:

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212729
SAMPLE ID: 632515-1

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 1

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.56	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212730
SAMPLE ID: 632515-2

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 2

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	2.44	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

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TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212731
SAMPLE ID: 632515-3

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 3

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	3.44	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212732
SAMPLE ID: 632515-4

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 4

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	1.11	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

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TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212733
SAMPLE ID: 632515-5

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 5

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.44	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212734
SAMPLE ID: 632515-6

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 6

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.17	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212735
SAMPLE ID: 632515-7

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 7

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.33	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212736
SAMPLE ID: 632515-8

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 8

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.17	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212737
SAMPLE ID: 632515-9

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 9

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.17	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212738
SAMPLE ID: 632515-10

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 10

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.22	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007

ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212739
SAMPLE ID: 632515-11

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 11

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.17	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
01171

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212740
SAMPLE ID: 632515-12

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 12

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.27	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

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7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212741
SAMPLE ID: 632515-13

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 13

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.67	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

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ACCOUNT NUMBER
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EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212742
SAMPLE ID: 632515-14

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 14

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.78	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

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7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212743
SAMPLE ID: 632515-15

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 15

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.44	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

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Laboratory Director

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ACCOUNT NUMBER
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EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212744
SAMPLE ID: 632515-16

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 16

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.39	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

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Laboratory Director

REPORT NO.
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ACCOUNT NUMBER
01171

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TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212745
SAMPLE ID: 632515-17

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 17

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.33	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

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Laboratory Director

REPORT NO.
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ACCOUNT NUMBER
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TO: BODYCOTE TESTING GROUP
7217 ROPER ROAD
EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212746
SAMPLE ID: 632515-18

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 18

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.44	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

REPORT NO.
C08212-7007
ACCOUNT NUMBER
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TO: BODYCOTE TESTING GROUP
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EDMONTON, AB T6B3J4

FOR: 632515

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#: 110015
LAB NUMBER: 212747
SAMPLE ID: 632515-19

SAMPLE MATRIX: SOLID
DATE RECEIVED: 07/28/2008
DATE REPORTED: 08/11/2008
PAGE: 19

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Total Organic Carbon	0.44	%	0.10	Combustion

Results reported on a dry weight basis
BDL - Below detectable levels

Results Authorized By:

Robert J. Deakin, B.Sc.,C.Chem.
Laboratory Director

Appendix 3: Qualifications and Information Pertaining to the Environmental Consultants

Name of Firm: Ecomark Ltd.

Address: 100 – 14964 – 121A Avenue, Edmonton, Alberta T5V 1A3

Phone: (780) 444–0706

Fax: 1–866–337–8631

Date Established: January 11, 2000

Insurance Coverage:

- Professional Errors & Omissions - $2,000,000
- Commercial General Liability - $1,000,000
- WCB Account

Safety Training: All professional staff at Ecomark has appropriate safety training in WHIMS, H_2S Alive, TDG, First Aid and Ground Disturbance Practices.

We excel in assessments, reclamation and remediation, and corporate environmental management. Our experience covers phase 1, 2, and 3 environmental assessments and environmental audits on the widest variety of industrial/commercial and residential properties and companies. We also have extensive facility experience, from scouting potential routes and facilities, through audit of existing facilities, to final reclamation and restoration of disturbed habitats.

One of our key strengths is corporate (government) liability assessments. We evaluate the environmental liability incumbent to a site or sites. We have been relied on by major corporations to place a monetary value on the environmental liability of assets being acquired, disposed of, or maintained.

Our staff provides Ecomark with 28 years of individual professional experience. We have appropriate professional errors and omission (E&O) insurance, contractors general liability (CGL) insurance, and Worker's Compensation. We have also attained Small Employer Certificate of Recognition (SECOR) safety status. A professional biologist, professional chemist, professional engineer, or professional geologist warrants all our work. We do quality, fully warranted assessments that all parties can understand.

Ecomark Ltd. Projects and Experience

Phase 1 Environmental Assessments

Phase 1 environmental assessments throughout Canada

Phase 2 Environmental Assessments

Phase 2 environmental assessments throughout Canada

Tier 2 risk assessments, Airdrie, Sundre, and North Garrington, Alberta

Phase 3 and 4 Environmental Assessments

Oilfields reclamation in Devon, Bonnie Glen and Redwater

Oil lease cleanups

Class 3 railway derailment cleanup and complete railway line abandonment

Diesel spill remediation

Fuel tank removals and cleanups

Underground storage tank remediation

Contaminated soil cleanups

Landfill reclamations

Salt spill weeping tile design and geotechnical assessment

Bioremediation, audit, waste cleanup, and process redesign

Erith River crossings reclamation

Peat bog sewage treatment field reclamation

Grading, cleanup, and reclamation of Mountain Park Loop

Pipeline crossing inspection, creek monitoring, and reclamation

Native grass and forbs species research for boreal forest reclamation

Stabilization of a mineral spring

Mitigation measures and further recommendations for rare native grasslands

Constructed wetland, survey, plan, construction

Wastewater tertiary treatment

Mould Assessments

Mould assessments

Indoor air quality assessments

Assessments – Reports, Acquisition, Habitat, Hazard, Environmental Impact and Others

Corporate environmental acquisition assessments

Chemical/brownfield site assessments

Federal and provincial environmental impact assessments

Health risk impact assessment, Health Board equivalent of an EIA

Environmental compliance audit for health facilities

Commercial environmental audits and technical reviews

Hazard identification assessments for industry, developers, and municipalities

Complete biophysical assessments, including wetland and aquatic assessments Compost research and field application trials

Nutrient management in intensive livestock operations

Effects on nitrogen leaching in soils with the application of bedding

Effects of phosphogypsum on compost

Waste operations

Route selection and design of river crossings for pipelines

Technology evaluations for secondary off-gas treatment, cement kiln

Scouting, application, and approvals for linear development projects

Medicine Lodge Loop environmental assessment

Environmental field report for Cheviot and Mountain Park Railway

Stormwater outflow inspection and installation, Atim Creek

Culvert installation under Atim Creek CN Right-Of-Way

Aquatic inspection in Athabasca and North Saskatchewan drainages

Fisheries monitoring studies and research and creek fisheries assessments

Transalta fish recovery tank for Lake Wabamun

Dredging impact literature search and sediment survey, Lake Wabamun

Rare plant studies throughout western Canada, including a study covering 1.8 million hectares in northwestern Saskatchewan, and smaller studies in BC and Alberta

Technology, composting alternatives, fly ash for road building material

Air, Water, Soil and Biomonitoring

Groundwater monitoring

Soil monitoring

Vegetation, lichen, and agricultural field biomonitoring

Establishment of biomonitoring plots complete with FCIR and Air Photo interpretation

Indoor air quality monitoring

Environmental Systems Development

Landfill design and development

Establishment of bioremediation, composting, and recycling facilities

Environmental training module and delivery

Environmental procedures manual for North American Construction Group

EUB waste module manual and delivery

Northern Alberta compost brochure and manual

Building operator training program waste module

Habitat restoration and environmental aspects of linear development

Fisheries training (linear development)

Cleanup of upstream oilfield sites for World Bank Russia training program

Training for Alberta Onsite Waste Water training program

Waste management system development

Waste module for downstream oilfield operations in Venezuela

Waste audit report on waste resource management at Northlands Park

Management of animal bedding from a race track by diversion from landfill and use in composting or incorporation into farm fields

Compost marketing study for the University of Alberta

Sewage field testing

Intensive livestock composting seminar for the County of Lamont

Assessment of waste dewatering market for Western Canada

Waste audit and waste minimization implementation

Development of integrated waste management facility for Fero, Yukon

Environmental management course, waste management, construction, and operations for Russia World Bank

Development of waste management facility for Margao, India

International hazardous waste management pricing survey

Operational enhancement of community septic system and design of new infiltration field

Establishment of hazardous waste transfer station, including market analysis

Assistance in establishing bioremediation market

Assistance and rewrite of production unit subscription and business plan

Assistance on CADR grinding technology

Assessment of proposals for PCB regulatory framework for Colombia

Historical environmental review for Paintearth Resource Recovery Centre, Coronation, Alberta

Energy management plan

Development of micropower interconnection on-line manual

Installation of monitoring and demonstration system for solar heating project

Applications, Licenses, and Regulatory Assistance

Facility approval applications

Integrated municipal waste facility Board of Health application

Industrial application for waste handling facilities

Waste management applications

AEUB Guide 58 applications

AEUB Guide 55 support

Water well application for facility water supply system

Redefinition of hazardous waste for Canadian Environmental Protection Act

Assessment of regulations for importation of hauling waste from other countries

Development of the Medicine Hat Waste Management Facility, Petro-Canada

Development of the Paintearth Resource Recovery Centre

Development of commercial land for Wetaskiwin, Alberta