

CopperFox Metals Inc. Schaft Creek Project

British Columbia, Canada

Schaft Creek Wetland Baseline Report 2007



Prepared by:

Rescan Environmental Services Ltd. Vancouver, British Columbia May 2008





Executive Summary

Wetlands are important ecosystems because they are valuable sources, sinks, and transformers of a multitude of chemical and biological material. They are sometimes described as "nature's water purifier" because of the functions they perform in the hydrological and biochemical cycles. They are also known as "biological supermarkets" for the extensive food chain and rich biodiversity they support. Wetlands are recognized world wide as critical habitat, through United Nations programs such as Ramsar; in Canada a substantial amount of wetlands have been lost due to development. Hence, developments now evaluate the number and type of wetlands which may be affected. This baseline report describes the wetlands in the Schaft Creek area such that the effects of the Project can be later be evaluated.

Within Canada, wetlands are described following the Canadian Wetland Classification System and conserved through the federal policy of wetland conservation. The objective of the policy is to "promote the conservation of Canada's wetlands to sustain their ecological and socioeconomic functions, now and in the future". There are four primary functions and four associated values. It was the objective of this study to identify the number and types of wetlands and the functions of these wetlands within the study area.

In June, 2006, two wetland sites (Schaft and Mess creeks) were selected for hydrological monitoring and continuous water level logging. Shallow wells were installed at these two sites. Hydrological monitoring was conducted from June to October, 2006, and again from July to October, 2007. Aquatic biological samples of primary and secondary production communities were sampled in the summer of 2007 from 12 wetlands: water and sediments were also collected from these sites to identify the chemical properties of the wetlands. The hydrological, aquatic biological and chemical sample results were assessed with ecosystem survey results to identify wetland function. The ecosystem survey followed provincial methodologies which incorporates provincially relevant ecosystem description methodologies and the federal descriptions of wetland class from the Canadian Wetland Classification System. The ecosystem survey data was also used to map the location and size of wetlands in the study area.

A total of 131 wetland ecosystems were mapped using ecosystem survey and TRIM GIS data. All five federally recognized wetland classes (bog, fen, marsh, swamp, and shallow open water) encompassing 23 provincial wetland ecosystem associations covering a total of 844.2 ha were mapped in the study area. Five provincially blue-listed ecosystems of concern (Wf05, Wf08, Wf13, Wb07, and Wb10) and one COSEWIC listed species of concern (western toad, *Bufo boreas*) were found in the study area. This ecosystem data was combined with the hydrological and aquatic biological survey data to support the descriptions of wetland function. The four wetland functions were identified in wetlands in the study area. Wetland function descriptions were then assessed against known current land use practices to identify and describe wetland value. The two values most important to wetlands in the study area are economic/social/cultural and maintenance of ecosystem health.



Acknowledgements

This report was prepared for Copper Fox Metals Inc. by Rescan Environmental Services Ltd. (Rescan). Soren Jensen (M.A.Sc.) was the Project Manager for the Environmental Assessment (EA) Application and Baseline Studies. The wetland study was coordinated by Wade Brunham (B.Sc.) and the report was written by Wade Brunham, Allyson Longmuir (M.Sc.), Dave Fauquier (B.Sc.), Katsky Venter (M.Sc.) and Steven Guenther (M.Sc.).

Field work was conducted by the following Rescan scientists: Wade Brunham, Dave Campbell (M.Sc., GIT.), Chris Doughty (B.Sc.), Steve Guenther (M.Sc., A.Ag.), Greg Norton (M.Sc.), Allyson Longmuir, and Dave Fauquier. Field assistance was provided by: Amanda Quash, and Dion Quash. Report production was coordinated by Joanna Lerner of Rescan.

Citation:

Rescan. 2008. *Schaft Creek Wetlands Baseline Studies Report 2007.* Report Prepared for Copper Fox Metals Inc. by Rescan Environmental Services Ltd. May 2008.



Schaft Creek Wetland Baseline Report 2007

TABLE OF CONTENTS

Execut	ive Sun	nmary	i		
Acknow	wledger	nents			
Table	of Conte	ents			
	List of Appendices				
	List of I	VII			
	List of	I ables			
	List Of	1 1ates	······································		
1.	Introduction1-				
	1.1	Schaft C	reek Project Summary1–1		
	1.2	Wetland	Ecosystem Study 1–7		
		1.2.1	Objectives 1–7		
2.	Methods2–1				
	2.1	Study Ar	rea		
	2.2	Hydrolog	gy Survey		
		2.2.1	Shallow Groundwater Well Installation		
		2.2.2	Continuous Monitoring		
	2.3	Aquatic 1	Biology		
	2.4	Ecosyste	m Survey		
		2.4.1	Preliminary Mapping		
	2.5	2.4.2 Wetland	Field Studies		
	2.5		Watland Area 2.10		
		2.5.1	Wetland Valuation 2–10		
_		2.0.2			
3.	Results	S			
	3.1	Wetland	Hydrology		
		3.1.1	Schaft Creek Wetland (SC)		
		3.1.2	Mess Creek Wetland (MS)		
	3 7	3.1.3	Hickman Creek (HC) and Skeeter Creek (SK) Wetlands		
	5.2		Biology and Fisheries Resources		
		5.2.1 3 2 2	water Quality		
		3.2.3	Primary Producers		
		3.2.4	Secondary Producers		

	3.3	Wetland Ecosystems			
		3.3.1	Bog		
		3.3.2	Fen		
		3.3.3	Marsh		
		3.3.4	Swamp.		
		3.3.5	Shallow	Open Water	
		3.3.6	Transitio	on and Other Associations	
		3.3.7	Rare Eco	osystem Associations	
	3.4	Wetland	Area		
	3.5	Wetland	Wildlife (Observations	
4.	Discu	ussion			4–1
	4.1	Wetland	Functions	and Values	
		4.1.1	Wetland	Functions	
			4.1.1.1	Hydrological Function	
			4.1.1.2	Biochemical Function	
			4.1.1.3	Ecological Function	
			4.1.1.4	Habitat Function	
		4.1.2	Wetland	Values	
			4.1.2.1	Commercial and Social/Cultural	
			4.1.2.2	Maintenance of Ecosystem Health	
5.	Sum	Summary			
	5.1	Wetland Hydrology			
	5.2	Wetland	Wetland Aquatic Biology		
	5.3	Wetland	Function	and Value	
Dofo	roncoc				D 1
17616					····· Γ · - Ι

LIST OF APPENDICES

- Appendix 1A Summary of 2006 Water Table Elevations
- Appendix 1B Summary of 2007 Water Table Elevations
- Appendix 2 Wetland Vegetation Species List
- Appendix 3 Wetland Ecosystem, Field Data, Classification, and Area

LIST OF FIGURES

Figure	Page
1.1-1	Location Map for Schaft Creek Project1-2
1.1-2	Schaft Creek Project Mineral Claims1-3
1.1-3	Schaft Creek Project Mine and Associated Infrastructure1-4
1.1-4	Proposed Access Road Alignment for the Schaft Creek Project
2.2-1	Schaft Creek Project Wetland Hydrological Monitoring Sites2-2
2.3-1	Schaft Creek Aquatics Wetland Sampling Sites, 20072-5
2.4-1	Schaft Creek Wetland Ecosystem Survey Locations2-7
3.1-1	Water Table and Longitudinal Elevation Profile for Schaft Creek Wetland 2006 3-2
3.1-2	Water Table and Longitudinal Elevation Profile for Schaft Creek Wetland 2007 3-4
3.1-3	Water Table and Longitudinal Elevation Profile for Mess Creek Wetland 20063-5
3.1-4	Water Table and Longitudinal Elevation Profile for Mess Creek Wetland 20073-6
3.1-5	Water Table and Longitudinal Elevation Profile for Skeeter Creek and Hickman Creek Wetlands
3.2-1	Total Nitrogen, Phosphorus and Total Organic Carbon (TOC) Concentrations in Wetland Sediments, 2007
3.2-2	Phytoplankton Biomass, Density and Genus Richness in Schaft Creek Project Wetlands, 2007
3.2-3	Benthic Invertebrate Density and Genus Richness in Schaft Creek Project Wetlands, 2007
3.3-1	Wetland Associations Observed in the Schaft Creek Study Area
3.3-2	Wetland Ecosystems: Schaft Creek, Tailings Option A
3.3-3	Wetland Ecosystems: Schaft Creek, Tailings Option C
3.3-4	Wetland Ecosystems: Schaft Creek, Saddle and Pit Area
3.3-5	Wetland Ecosystems: Schaft Creek, Tailings Option B

Table of Contents

3.3-6	Wetland Ecosystems: Schaft Creek, Proposed Road (North)3-	-31
3.3-7	Wetland Ecosystems: Schaft Creek, Proposed Road (South)	-33

LIST OF TABLES

Table	Page
2.2-1 Details of Wetland Hydrological Monitoring Sites	2–1
3.3-1 The Number of Wetlands Observed in Each Wetland Class	3–14
3.3-2 Summary of Rare Wetland Ecosystems	3–53
3.4-1 Wetland Area of each Wetland Class of the Schaft Creek Study Area	3–54
3.4-2 Wetland Area in Proposed Mine Development Areas	3–54
3.5-1 Wildlife Observations from Schaft Creek Study Area Wetlands	3–55
4.1-1 Wetland Function and Associated Fieldwork Component	4–1

LIST OF PLATES

Plate	Page
3.1-1 Schaft Creek Wetland (view to the west)	3–1
3.1-2 Mess Creek Wetland (view to the southwest)	3–3
3.1-3 Hickman Creek Wetland (view to the northwest)	3–7
3.3-1 Yellow Pond Lily Shallow Open Water and Scrub Birch Water Sedge Fen Wetland Complex.	3–14
3.3-2 Bog* at site SW89	3–16
3.3-3 Wb01 Bog at site SW5	3–21
3.3-4 Wb02 Bog at site SW13	3–22
3.3-5 Wb05 Bog at site SW28	3–23
3.3-6 Wb07 Bog at site SW18	3–24
3.3-7 Wb13 Bog at site SW53	3–25

3.3-8 Fen* at site SW86	-26
3.3-9 Fen* at site SW94	-26
3.3-10 Wf01 Fen at site SW76	-35
3.3-11 Wf02 Fen at site SW3	-36
3.3-12 Wf04 Fen at site SW54	37
3.3-13 Wf05 Fen at site SW363-	·38
3.3-14 Wf07 Fen at site SW1	39
3.3-16 Wf10 Fen at site SW24	41
3.3-24 Yellow Pond Lily community at site SW603	49
3.3-25 Horsetail community at site SW783-	·50
3.3-26 Pond Weed community at site SW473–	·50
3.3-27 Non-vegetated shallow open water ecosystem at SW43	·51
3.3-28 Shrub-carr community at SW343-	·52
3.3-29 Flood association on Mess Creek connected to upland forest	. 52
4.1-1 Water seeping from a Wf07 Fen into Tailings Option C Creek4-	-2



1. Introduction

1.1 Schaft Creek Project Summary

Copper Fox Metals Inc. (Copper Fox) is a Canadian mineral exploration and development company focused on developing the Schaft Creek deposit located in north-western British Columbia, approximately 60 km south of the village of Telegraph Creek (Figure 1.1-1). The Schaft Creek deposit is a polymetallic (copper-gold-silver-molybdenum) deposit located in the Liard District of north-western British Columbia (Latitude 57° 22' 4.2''; Longitude 130°, 58' 48.9''). The property is comprised of 40 mineral claims covering an area totalling approximately 20,932 ha within the Cassiar Iskut-Stikine Land and Resource Management Plan (Figure 1.1-2).

The Schaft Creek Project (The Project) is located within the traditional territory of the Tahltan Nation. Copper Fox has been in discussions with the Tahltan Central Council (TCC) and the Tahltan Heritage Resources Environmental Assessment Team (THREAT) since initiating exploration activities in 2005. Copper Fox has engaged in numerous agreements with the TCC including a Communications Agreement, Traditional Knowledge Agreement, Letter of Understanding with the Tahltan Nation Development Corporation (TNDC) and a THREAT Agreement. Copper Fox will continue to work together with the Tahltan Nation as work on the Schaft Creek Project continues.

The Schaft Creek deposit was discovered in 1957 and has since been investigated by prospecting, geological mapping, geophysical surveys as well as diamond and percussion drilling. Over 65,000 meters of drilling has been completed on the property as of end of 2007. Additional drilling is planned for 2008 to support future economic assessments of the property and an environmental assessment application.

The Schaft Creek Project entered the British Columbia environmental assessment process in August 2006. Although a formal federal decision has not yet been made, the Project will likely require federal approval as per the Canadian Environmental Assessment Act. Copper Fox has targeted the end of 2008 for submission of their Schaft Creek Environmental Assessment Application.

Copper Fox has recently released a scoping level engineering and economic report for Schaft Creek. The mine and associated infrastructure are presented in Figure 1.1-3. The current mine plan has ore milled from an open pit at a rate of 65,000 tonnes/day. The Schaft deposit will be mined with large truck/shovel operations and typical drill and blast techniques. An explosives manufacturing facility will be constructed on-site to support blasting activities. The mine plan includes 719 million tonnes of minable ore over a 31 year mine life. The Project is estimated to generate up to 1,200 jobs during the construction phase of the Project and approximately 500 permanent jobs during the life of the mine.







Ore will be crushed, milled and filtered on-site to produce copper and molybdenum concentrates. The mill will include a typical comminution circuit (Semi-Autogenous Mill, Ball Mill and Pebble Crusher) followed by a flotation circuit and a copper circuit with thickener, filtration and concentrate loadout and shipping. The mill includes a designated molybdenum circuit with thickener, filtration circuit, drying and bagging. The filter plant will be located at the plant site. A tailings thickener and water reclaim system will be used to recycle process water. The circuit will have a design capacity of 70,652 tonnes per day and a nominal capacity of 65,000 tonnes per day (23,400,000 tonnes per year). The copper and molybdenum concentrates will be shipped via truck from the mill to the port of Stewart, BC.

Copper Fox will construct an access road from Highway 37 to the Schaft Creek property. Access to the property from Highway 37 will require approximately 105 km of new road. The first 65 km of the access road to the Schaft Creek property corresponds to the Galore Creek access road. NovaGold and Teck Cominco have currently put a hold on future construction efforts along their access road and the overall Galore Creek Project. Copper Fox will seek approval from the provincial government and NovaGold/Teck Cominco to construct the first 65 km of the Galore Creek access road should the status of the Project not change.

The route of the final 40 km of access road has not been finalized. Copper Fox has completed initial investigations of a route along Mess Creek. An alternative route is also being considered that utilizes the plateau to the east of Mess Creek. Copper Fox is currently investigating the feasibility, as it relates to geohazards, of the two alignments. Both alignments include a 30 m bridge on Mess Creek. Mess Creek is considered navigable as per Transportation Canada criteria. Figure 1.1-4 presents the access road alignment that follows the Galore Creek road (65 km from Highway 37) and the Mess Creek alignment (40 km) to the Schaft Creek property.

Over the life of the mine, the Schaft Creek Project will generate over 700 million tonnes of tailings. There are three tailings facilities being considered (Figure 1.1-3). The three options will undergo an alternatives assessment that will include engineering, construction and operating costs, geotechnical, geohazards, environmental and social considerations.

The Project will generate over a billion tonnes of waste rock. Waste rock dumps are proposed around the perimeter of the pit (Figure 1.1-3). This includes the flat area between the proposed pit and Schaft Creek.

A detailed water management plan has yet to be developed for the Project. A water management plan will be included in the next level of economic assessment (pre-feasibility) and the next Project description update. A waste water discharge is expected from the tailings facility, waste rock dumps and domestic waste water treatment plant. The management plan will detail the plans to minimize natural drainage into the tailings facility, the pit and the waste rock dumps. Pit water will be pumped to the tailings facility.

A new airfield will be constructed to the east of the pit (Figure 1.1-3). The Project will be a flyin, fly-out operation. The new landing strip will be capable of handling a Boeing 737. Other facilities include a terminal building, fuelling, maintenance and control facilities.



A permanent camp will be constructed to support a staff of approximately 500 employees. Other facilities include truck shop, warehouse, administration, maintenance laboratory, explosives storage, water treatment facilities and potable water storage.

Copper Fox has targeted the end of 2008 for submission of their Environmental Assessment Application and full Feasibility Report. Screening of the EA Application plus the 180 day review period will result in Project approval as early as July 2009. Copper Fox will likely seek concurrent permitting for strategic permits to facilitate the timely construction of key Project components. Construction is estimated to take two and half years. Thus, production could begin by early 2012.

1.2 Wetland Ecosystem Study

As part of the baseline studies conducted for the Project, a survey of wetland ecosystems was initiated in June 2006. Wetland hydrological data was collected during both baseline study years (2006 and 2007) and a comprehensive wetland survey was completed in 2007. The wetland survey incorporated provincially recognized ecosystem description methodology, water quality sampling, and aquatic biology surveys and sampling. A study area was established to map and classify any wetlands potentially affected by Project development and includes the following areas:

- 100 m either side of the proposed centre line of the Mess Creek access option;
- within 150 m of any proposed mine facility and infrastructure; and
- the three tailings options.

1.2.1 Objectives

The objectives of the wetland baseline studies program were to determine the hydrological physical, chemical and biological characteristics of wetlands and to identify the quantity, size and location of wetlands within the study area. Once the wetland classification was complete, an assessment of wetland function and associated values was conducted. This assessment considered wetland characteristics, along with relevant information from the scientific community to identify ecosystem functions that have the greatest value or potential value to society such as flood protection and habitat for culturally/economically important wildlife species.



2. Methods

2.1 Study Area

The study area for the Schaft Creek Wetland baseline study includes all areas at or near proposed development features. Wetlands were surveyed, identified, or mapped if they were within 100 m of the centre line of the proposed Mess Creek access option, within 150 m of any proposed infrastructure development (airstrip, mine site roads, waste rock piles, plant sites, *etc.*), and in each tailings option (Tailings Options A, B, and C).

2.2 Hydrology Survey

Wetland hydrology studies were conducted during the summer field season (June to October, 2006 and 2007) at four representative wetlands in the Schaft Creek Project area (Figure 2.2-1). This monitoring was conducted to provide hydrological data characteristic of the area that could be used to infer the hydrology of wetlands throughout the baseline studies area. The wetland hydrology study has two components: static surveys of the wetland water table and continuous monitoring of shallow sub-surface water.

Locations of the six wetland hydrological monitoring sites are presented in Figure 2.2-1 and details of the monitoring sites are summarized in Table 2.2-1.

Wetland Name / Well	Location (Northing, Easting)	Wetland Class	Type of Monitoring
Schaft Creek Wetland SC-A	381407 6377210	Marsh/Fen - Complex	Continuous
Schaft Creek Wetland SC-B	381193 6377335	Marsh/Fen - Complex	Continuous
Mess Creek Wetland MS-A	384458 6360461	Marsh	Continuous
Mess Creek Wetland (MS-B)	384343 6360416	Marsh	Continuous
Skeeter Creek Wetland (SK)	382204 6367804	Fen	Static
Hickman Creek Wetland (HC)	378845 6356530	Bog	Static

Table 2.2-1Details of Wetland Hydrological Monitoring Sites

*All coordinates in UTM9

2.2.1 Shallow Groundwater Well Installation

Shallow (< 1.0 m below ground surface) groundwater wells were installed at the Schaft Creek (SC) and Mess Creek (MS) study wetlands at the beginning and end of each transect. Wells consisted of 1 inch PVC pipe with a drive point installed using a hand auger and a sledge hammer.

Water level elevation was measured (relative to the ground surface) between the groundwater wells in the SC and MS wetlands. The Hickman Creek (HC) and Skeeter Creek (SK) wetlands did not receive any wells and the wetland transect consisted of a single surveyed cross-section on June 24th, 2007 and June 19th, 2006 for the two wetlands, respectively.



The wells were installed on June 19th, 2006 and continuous water level data was collected from that time until September 9th, 2006. In 2007, continuous water level data was collected from June 24th until November 11th.

A builder's level (transit) was used to determine distance and relative elevation of the ground surface and standpipe height of all of the groundwater wells. The surface water features along the lateral cross-section were also surveyed at the time of groundwater well installation.

Due to the relatively unstable conditions of the wetland surfaces, surveyed elevations are assumed to have an error of ± 0.01 m.

2.2.2 Continuous Monitoring

The four wells in the Mess and Schaft Creek wetlands were continuously monitored throughout the open water season of 2006 and 2007. Continuous monitoring consisted of recording water level data within study wetlands using Solinst® leveloggers (automated pressure transducers). Water levels were recorded at 30 minute intervals. A barologger was also installed at the SC wetland to correct the levelogger data for changes in atmospheric pressure at the SC and MS wetlands. Daily average water table measurements are presented in Appendices 1A and 1B for 2006 and 2007, respectively.

2.3 Aquatic Biology

A component of the aquatics baseline studies for the Schaft Creek Project is a characterization of aquatic resources in wetlands in the study area and along the road route. Characterization of aquatic resources included assessing water and sediment quality, primary producer (phytoplankton) communities and benthic invertebrate communities. Assessment objectives include determining baseline conditions of these aquatic components within the Project area.

A total of twelve wetland sites were assessed during the 2007 baseline studies (Figure 2.3-1). WL8 appears in Figure 2.3-1 but was actually assessed and discussed in the stream section of the aquatics baseline report since it more resembles stream rather than wetland habitat. All sites were sampled during August, 2007. Detailed methods regarding field sampling, sample and data analyses can be found in the Section 2 of the Schaft Creek 2007 Aquatic Resources Baseline Report (Rescan, 2008a). All of these wetlands were also assessed to determine fish presence.

2.4 Ecosystem Survey

Wetland ecosystem surveys initiated in July 2007 were done to classify wetland ecosystems to the Canadian Wetland Classification System (class level) and provincial site association.

2.4.1 Preliminary Mapping

Prior to field work, wetlands to be surveyed were identified using available Terrain Resource Inventory Management (TRIM) geographic information system (GIS) data. ArcView 9.2 was used to overlay proposed Project features (tailings containment options, mill sites, roads, etc.) and TRIM wetland shape files. If TRIM wetlands were identified with in a "reasonable distance" to proposed Project features, they were selected for survey. The selection was based on the topography, abundance of wetlands near the site, and proximity to surface water features. Four, large scale maps were created and used in the field to track survey progress and identify areas or focus.

2.4.2 Field Studies

Field studies were conducted to classify the wetlands identified within the study area. On the ground classification is required to provide detailed descriptions of the wetlands types and characteristics. TRIM data includes some wetland classification, but at a broad level of organization.

The TRIM data is useful for identifying the locations of wetlands and their size. However, it is insufficient to provide detailed ecosystem information. The wetlands in TRIM are defined into two classes 1) marsh and 2) swamp. These two wetland classes are recognized as two of the five federal wetland classes (Warner and Rubec, 1997). Bogs, fens, and shallow open water wetlands (the remaining three federal wetland classes) are not differentiated by TRIM and are either included in the two TRIM classes or not mapped as wetlands altogether. The definitions for marsh and swamp supplied by TRIM (Ministry of Environment, Land and Parks, 1991) are:

- 1. Marsh A water-saturated, poorly drained, treeless area intermittently or permanently water covered, having cattail, rushes or grass-like vegetation.
- 2. Swamp A water-saturated area, intermittently or permanently covered with water, having shrubs.

It is likely that some shallow open water, fens and tree-less bogs are included in the TRIM marsh class. The TRIM swamp class does not include treed swamps; treed swamp associations can represent a major percentage of wetlands in northwest British Columbia and high elevation biogeoclimatic zones (MacKenzie and Moran, 2004). Bogs and shallow open water are not included in either TRIM class; however, shallow open water wetlands may appear as small lakes. The field studies are intended to qualify the wetlands within the study area as they relate to the federal descriptions of class (Warner and Rubec, 1997) and the provincial description of ecosystem association (MacKenzie and Moran, 2004).

Wetlands were surveyed according to methods outlined in *Field Description of Wetland and Related Ecosystems in the Field*, (MacKenzie, 1999) and *Wetlands of British Columbia: A Guide to Identification*, (MacKenzie and Moran, 2004). Wetland sample locations are displayed in Figure 2.4-1.

Plots were established in the centre of large (> 20 m x 20 m) uniform wetlands, on the boundaries between different wetland associations in the same complex or at the ecosystem edge in amorphous and small (< 20 m x 20 m) wetlands. At the centre of the plot, a soil pit was dug and a GPS coordinate was taken. Photographs were taken in each cardinal direction of the soil pit, soil surface, a representative soil sample and other significant features such as landforms, unique vegetation and wildlife.





Ground Inspection Forms (GIF) were used to record field notes. Information recorded on the field form included:

- Plot Number;
- Project ID;
- Surveyor;
- Date;
- Photograph Numbers;
- GPS coordinates in Universal Transverse Mercator (UTM);
- Aspect (slope direction);
- Meso Slope Position (site position in the overall landscape);
- Soil Moisture Regime (hydrodynamic index);
- Soil Nutrient Regime (nutrient content; poor to rich);
- Drainage Mineral Soils (drainage of all soils);
- Moisture Subclasses Organic Soils (location and types of water features);
- Mineral Soil Texture;
- Organic Soil Texture (notes on decomposition);
- Surface Organic Horizon Thickness;
- Humus Form (decomposition of surface layer);
- Root Restricting Layer;
- Coarse Fragment Content;
- List of Vegetation (dominant/indicator plant species and percent cover); and
- Site Diagram on waterproof paper.

The hydrodynamic index, a measure of vertical and/or lateral water flow through the wetland was recorded in the GIF form's Soil Moisture Regime field. The Drainage Mineral Soils field was used to document the drainage of all soils, mineral or organic. Moisture Subclasses – Organic Soils was used to comment on water presence above or below the ground and its availability through surface or groundwater pathways. Organic Soil Texture was used to record the texture and decomposition of the organic horizons (humic – very decomposed, mesic – moderate decomposition, fibric – little decomposition). The site diagram space on the GIF was used for a diagram of the soil pit, a soil colour smear (to record measurements of soil water and surface water pH) and to describe peat development, rooting depth and the level of decomposition using the von post scale of decomposition.

The soil survey methodologies for wetland ecosystem classification principally follow *The* Canadian System of Soil Classification (CSSC, 1987), Towards a Taxonomic Classification of

Humus Forms (Green et. al., 1993), Describing Ecosystems in the Field (Luttmerding et. al. 1990), and Field Description of Wetland and Related Ecosystems in the Field (MacKenzie, 1999). These methods require soil identification to a depth of 160 cm or lithic contact. Often super-saturated soils and shallow alpine soils made deep sampling impossible. Soil pits were dug to a minimum depth of 40 cm, or when significant contact with the water table or lithic/parent material was made.

A vegetation species list and relative percent vegetation cover were recorded at each plot. Special focus was placed on wetland association indicators such as *Carex spp.* and *Salix spp.* Vegetation identification in the field followed: *Plants of Costal British Columbia* (Pojar and Makinnon, 1994), *Plants of Southern Interior British Columbia* (Parish *et. al.* 1996), and *Plants of the Western Boreal Forest and Aspen Parkland* (Johnson *et. al.*, 1995). Species not identified in the field were collected and identified in Vancouver B.C. using *The Illustrated Flora of British Columbia: Volumes 1-6* (Douglas *et. al.* 2001).

Site diagrams were drawn to show specific vegetation community locations and terrain features. The plot centre was shown in relation to the wetland and other features such as the location of unique topography, water sources, existing infrastructure, and wildlife observations. Once the site diagram was finished, the soil pit was filled in and the field team moved to the next study plot.

2.5 Wetland Classification

Wetland classification was completed, where possible, in the field and followed Warner and Rubec (1997) for "class" level classification and MacKenzie and Moran (2004) for "site association" level classification. Wetland class describes associations with similar basic underlying environmental characteristics that support similar species guilds at climax (MacKenzie and Moran, 2004). There are five federal wetland classes (bog, fen, marsh, swamp, and shallow open water). Site association defines all sites capable of supporting a similar plant association at climax (MacKenzie and Moran, 2004). There are a number of site associations in each wetland class.

Occasionally, classification was not possible in the field, due to time constraints or unidentified vegetation; and in these cases a post-field classification was done. The botanical name of all vegetation species identified in the field and office were entered into a database to aid in post-field classification of wetlands to provincial site association (MacKenzie and Moran, 2004) (Appendix 2). Wetlands were classified to the lowest level, typically site association, and that information, along with the field data, were entered into a database (Appendix 3).

Wetlands are described as complexes where they are composed of more than one wetland class or association. Following terrestrial ecosystem mapping standards (RIC, 1998) ecosystem complexes were separated into three deciles. The deciles used in the wetland study are different from ecosystem mapping deciles in that they are only relative measure of size as opposed to a percentage of ecosystem area. The size of the ecosystem described as decile-1 is larger than the decile-2 ecosystem, which in turn is larger than the decil-3 ecosystem. This division of complex wetland ecosystems allows each association in a wetland complex to be identified and classified (Appendix 3).

2.5.1 Wetland Area

Wetland area is estimated using field observations and TRIM data. The results from these area calculations are reported throughout the baseline report as wetland association areas (Section 3.3). The wetland area calculation converts the data presented in Appendix 3 into an ESRI Shape file. This file is added to a GIS file of the proposed development options and TRIM wetlands. The field data file is spatially joined to any TRIM wetland that is completely or partially within any proposed development feature. Photographs and field data for non surveyed sites are used to supplement classification information for any TRIM wetlands that were not physically surveyed. The areas of each wetland association, as calculated from the TRIM wetlands, are then incorporated into the database (Appendix 3) and included in the ecosystem association descriptions (Section 3.3).

2.5.2 Wetland Valuation

The Wetland Environmental Assessment Guideline (Environment Canada, 2003) states that environmental impacts to wetlands should be assessed against the function and value of wetlands. Environment Canada (2003) identified a list of eight functions and values.

Wetland functions are defined as a process or series of processes that take place within a wetland (Novitzki, *et. al.*, 1997). All wetland associations identified in the study area were evaluated for function based on the information collected during baseline studies. All of the functions were observed in the study area; however, the degree of the function varies between wetlands. Wetland functions, as established by the federal *Wetland Environmental Assessment Guideline* (Environment Canada, 2003), include the following:

- 1. Hydrological functions contribution of the wetland to the quantity of surface water and groundwater;
- 2. Biochemical functions role wetlands in relation to biochemical regulation of water chemistry;
- 3. Habitat functions availability and use of both terrestrial and aquatic habitats; and
- 4. Ecological function role and uniqueness of wetlands with respect to surrounding ecosystems.

Wetland values are not processes that take place within wetlands but involve the benefits that wetlands provide to the surrounding environment or to people. Wetlands can have ecological, social and economic values. Each of the values identified in this assessment are described in terms of their associated wetland function. Not all functions are assessed as values; for example, wetlands may provide habitat for mosquitoes; however, this is not a function that society typically values. Wetland values, as established by the federal *Wetland Environmental Assessment Guideline* (Environment Canada, 2003), include the following:

- 1. Social/Cultural/Commercial values;
- 2. Aesthetic/Recreational values;

- 3. Education and Public awareness; and
- 4. General considerations.

The value of land, including wetlands, is typically made easier to comprehend when expressed in monetary terms. This approach has been taken by the B.C. Ministry of Environment (MOE) which has expressed the value of the province's wetlands in terms of their estimated dollar value (B.C. MOE, 2005). To generate the monetary value of B.C.'s wetlands the MOE used the rate of \$19,580 per wetland hectare/year (U.S. 1994) developed by Costanza *et al.* (1997). Although this rate is easily applied by the lay person, the suitability of this type of value assessment to specific wetland areas is questionable. For instance, some wetlands in the study area, given their remote location, do not have all of the values (*e.g.*, peat harvesting, education and instructional) included in the Costanza *et al.* (1997) calculation. Consequently, the discussion of the value of wetlands within the study area will not generate specific monetary values. Instead the value of wetlands will be discussed from the viewpoint of broad ecosystem functions with comments on the importance of these functions to society.



3. Results

3.1 Wetland Hydrology

3.1.1 Schaft Creek Wetland (SC)

Schaft Creek Wetland (SC) is located along Schaft Creek to the north of the Project area (Figure 2.2-1). The lateral cross-section of the wetland was established approximately perpendicular to Schaft Creek (Plate 3.1-1).



Plate 3.1-1. Schaft Creek Wetland (view to the west).

The lateral cross section of the SC wetland in both years (2006-2007) indicates the water level between the two wells at that point in time (Plate 3.1-1). The continuous water level record from the wells identifies the seasonal variability of the water table in the wetland (Figure 3.1-1 and 3.1-2). This real time water table variation was used to estimate the seasonal maximum and minimum water table elevations for the wetland transect.

Generally, the data showed that the water table was above the surface in the low lying portion and below the surface in areas that were elevated for both years. Seasonally the water table varied from 65 cm to almost 80 cm, with the greater variation occurring in well A which lies at a higher elevation than well B. In general, the water table was estimated to be above the surface of the ground for the majority of both the 2006 and 2007 season. The exception was in the higher elevation site (near well A) where the water table was never above the surface in either year.



In 2006, the water levels were highest during August while in 2007 a slightly higher water table was observed during early July but with no noticeable seasonal pattern. These patterns suggest that during the two years of study the hydrology of the SC wetland was controlled by precipitation events. In 2006, precipitation clearly dominated the water table levels with two large rises in water table elevation in late July and early September. In 2007, the pattern is not as clear but the repeated rise of water table elevation is consistent with the relatively wet open water season that occurred during 2007 (Figure 3.1-2).

3.1.2 Mess Creek Wetland (MS)

The Mess Creek (MS) wetland is located east of the proposed mine infrastructure alongside Mess Creek (Figure 2.2-1). The lateral cross-section of the wetland is oriented approximately perpendicular to Mess Creek at that location (Plate 3.1-2).



Plate 3.1-2. Mess Creek Wetland (view to the southwest).

The two lateral cross-sections that were conducted suggest that the water table was above the surface for the length of the cross-section (Figures 3.1-3 and 3.1-4). Contrary to the Schaft Creek wetland the MS wetland showed little response to precipitation events in either year. The overall trend of the hydrology suggests that this wetland is dominated by the spring snow melt. In 2006, the water table decreased throughout the open water season. In 2007, the water table rose substantially in early July, declined for the remainder of the season and increased minimally in the fall.

metals inc.



Water Table and Longitudinal Elevation Profile for Schaft Creek Wetland 2007





Water Table and Longitudinal Elevation Profile for Mess Creek Wetland 2006


3.1.3 Hickman Creek (HC) and Skeeter Creek (SK) Wetlands

The Hickman Creek wetland (HC) is located south of the mine infrastructure and downstream of Tailings Option B (Figure 2.2-1). The lateral transect crosses Hickman Creek (Plate 3.1-3). Skeeter Creek wetland lies northeast of the proposed main pit in Tailings Option A.



Plate 3.1-3. Hickman Creek Wetland (view to the northwest).

No continuous monitoring wells were installed in either of these two wetlands; hence, only information from the one time lateral cross-section can be interpreted. For both wetland transects the water table was near or above the ground surface at the time of the survey (Figure 3.1-5).

3.2 Aquatic Biology and Fisheries Resources

Data presented here is a summary of wetland specific data from the aquatic resources sampling program. Complete results as well as raw data in appendices are available in Rescan (2008a).

3.2.1 Water Quality

No major trends were observed between watersheds, though the Mess Creek watershed had slightly higher concentrations of ammonia, hardness, TDS and total and dissolved arsenic, boron, and manganese. More than half of the water quality variables analyzed had 50% or more samples below the detection limits. The Schaft Creek and Skeeter watersheds generally had low water hardness, while the Mess Creek watershed had moderate to high hardness.



Total dissolved solids followed a similar pattern to hardness, though high concentrations were seen in WL2 (889 mg/L) (Figure 2.3-1). All wetlands had near neutral pH and low concentrations of total suspended solids. Water was fairly clear at most wetlands (0.36 to 1.58 NTU) though higher levels of turbidity were observed at WL3, WL6, and WL10, which had the highest turbidity at 45.9 NTU. Nutrients were relatively low at all wetlands with total phosphates having a maximum concentration of 0.0209 mg/L and total nitrogen maximum concentration of 0.81 mg/L.

Total and dissolved nickel and copper, and dissolved cadmium were considerably higher at WL7 than all other wetlands. Dissolved aluminum and iron, and total zinc were highest at Airstrip WL. Variables that exceeded B.C. or CCME aquatic life guidelines included total cyanide, sulphate, dissolved cadmium, total zinc, and total and dissolved aluminum, boron, copper and iron. Total iron exceeded guidelines at six wetland sites and total cyanide and total aluminum exceeded guidelines at three wetlands. Two wetlands sites, WL4 (Skeeter watershed) and WL9 (Mess Creek watershed), did not record any variables in excess of B.C. or CCME aquatic life guidelines.

3.2.2 Sediment Quality

Wetland sediments were primarily composed of silt (33% to 64%) and clay (6% to 54%) with smaller proportions of sand and very little gravel. WL3 was the only exception to this, being dominated by sand (64%). The average total phosphorus (TP) concentration between wetlands was 692 mg/kg (Figure 3.2-1). Wetland WL4 had the highest TP concentration at 1330 mg/kg. Schaft Creek wetland WL1 and Mess Creek wetlands WL9 and WL6 also had relatively high TP concentrations. Total nitrogen (TN) and total organic carbon (TOC) followed similar trends, with the lowest values occurring at WL3 (0.05% and 0.7%, respectively) and the highest at WL7 (1.4% and 18.1 %, respectively) (Figure 3.2-1).

Of the metals analyzed, antimony, bismuth, cadmium, lead, selenium, silver, thallium and tin were not detected in more than 80% of wetland sediment samples. Lower Schaft Creek wetland (WL1), Skeeter wetland (WL4), and upper Mess Creek wetlands (WL5 and WL6) often had the highest concentrations of metals including aluminum, arsenic, chromium, cobalt, magnesium, mercury, nickel, vanadium, and zinc. Of these wetlands, WL4 and WL6 were most often the highest in the aforementioned metal concentrations. All wetland sites exceeded at least one metal guideline. Copper, iron, and nickel exceeded guidelines at most wetlands, while one wetland (WL4) exceeded zinc guidelines. Arsenic and chromium exceeded guidelines at six and three wetlands, respectively.

3.2.3 Primary Producers

Biomass is a common measurement of productivity (the formation of new organic material) in aquatic systems. Primary producer biomass is measured as the concentration of chlorophyll a in a sample, which represents the photosynthetic (autotrophic) portion of the community.

copper FQ



Phytoplankton biomass varied widely between wetlands and was highest within the Mess Creek watershed (Figure 3.2-2). Biomass ranged from 0.02 (WL4) to $3.03 \mu g/L$ (WL6), with a mean of 0.56 $\mu g/L$ chlorophyll *a*. Phytoplankton densities were also highest in the Mess Creek watershed and ranged from 2 (WL10) to 419 cells x $10^3/L$ (Airstrip WL), with a mean of 103 cells x $10^3/L$. Genus richness between the twelve wetlands ranged from 3 to 15 phytoplankton taxa, with a mean of 9 genera (Figure 3.2-2). Chyrsophyta (golden algae) dominated most wetland communities and accounted for an average of 61% of the phytoplankton communities in surveyed wetlands. The one exception was Airstrip WL, where the wetland was dominated (84%) by Chlorophyta (green algae), although smaller proportions of cryptophytes and cyanophytes (blue-green algae) were also present. The Shannon and Simpson diversity indices assigned WL11 as the most diverse wetland site. The mean Shannon and Simpson diversity indices across all wetlands are 1.54 and 0.69, respectively.

3.2.4 Secondary Producers

Since benthic invertebrates are sedentary and continually exposed to the chemical composition of sediments, they are ideal for monitoring ecosystem health in fresh water environments. The relatively high diversity of these communities also facilitates monitoring a variety of community reactions to a range of environmental stressors.

The average density of benthic invertebrates varied between wetlands, ranging from 1,718 (WL10) to 53,630 organisms/m² (WL10) (Figure 3.2-3). However, of the twelve wetlands sampled, nine had densities between 13,000 to 39,000 organisms/m². Wetlands within Mess Creek watershed had the highest densities of benthos. Average benthos genus richness ranged from 6 to 21, but most wetlands ranged from 10 to 13 taxa (Figure 3.2-3). Diptera (flies) were the dominant taxonomic group at eight of the twelve wetlands sampled (WL7, WL3, WL4, WL9, WL6, WL5, and WL2) accounting for over 50 percent of all organisms collected. Diptera were almost exclusively from the chrionomid family (98%). Mollusca were the second most abundant taxonomic group, followed by Oligochaeta (worms). Amphipoda were present in relatively high numbers at two wetlands (WL11 and WL7) and cladocera, hirudinea, nematoda, arachnida, ostracoda, copepoda, and bryozoa made up smaller proportions of the wetland benthos communities.

Little variation was observed between wetlands and their corresponding Shannon and Simpson Diversity Indices. The Shannon Diversity Index values ranged from 1.16 (WL4) to 2.38 (WL1), though most wetlands had between values of 1.49 and 2.05. The Simpson Diversity Index values ranged from 0.49 (WL9) to 0.85 (WL1), while most wetlands fell between 0.66 and 0.85.

3.3 Wetland Ecosystems

A total of 97 wetland ecosystem plots were surveyed in the Schaft Creek Wetland Study area. All 5 federally recognized wetland classes are present in the area with 24 distinct site associations making up the classes. Table 3.3-1 presents the number of ecosystems observed in each class. In addition to the wetlands identified, two transition ecosystems were also surveyed in the study area; a shrub-carr and flood. Transition ecosystems are similar to wetlands but lack









Density (organisms/m²)

60,000

40,000

20,000



Note: Error bars represent the standard error of the mean

FIGURE 3.2-3





Wetland Class	Number Observed	Percentage of Total
Bog	14	14.4
Fen	60	61.8
Marsh	12	12.4
Swamp	5	5.2
Shallow Open Water	4	4.1
Transition	2	2.1
Total	97	

Table 3.3-1The Number of Wetlands Observed in Each Wetland Class

either the vegetation component, soil conditions, or water availability to be classified as a wetland. It is likely there are other transition associations in the riparian areas of Mess and Schaft Creeks; however, these communities are not the focus of this study and are only briefly described.

The most common wetland class in the study are is the fen class; 9 site associations were observed in this class (Figure 3.3-1). It is very common for wetlands in the study area to exist as a complex with other wetland ecosystems, as opposed to a distinct simple wetland community. Plate 3.3-1 shows a common wetland complex observed in the Schaft Creek wetland study area. The following sections describe the federal ecosystem class and the provincial site association.



Plate 3.3-1. Yellow Pond Lily Shallow Open Water and Scrub Birch Water Sedge Fen Wetland Complex.

Note: The Yellow Pond Lily Shallow Open Water Community is the 'pond' area in the centre of the plate. The Scrub Birch Water Sedge community is on the far side of the pond and extends from the water's edge back to the tree line.





Wetland Associations Observed in the Schaft Creek Study Area



3.3.1 Bog

A bog is a nutrient-poor, *Sphagnum* dominated peatland ecosystem in which the rooting zone is isolated from mineral-enriched groundwater, soils are acidic and few minerotrophic plant species occur (MacKenzie and Moran, 2004). Bogs may be treed or tree-less and are usually covered with *Sphagnum spp*. and ericaceous shrubs. Precipitation, fog and snowmelt are the primary water sources, making all bogs ombrogenous. Precipitation does not usually contain dissolved minerals and is mildly acidic; subsequently bog waters are low in dissolved minerals and acidic in nature. Bog water acidity is enhanced because of organic acids formed during the decomposition of peat (Warner and Rubec, 1997). A total of 5 bog associations were identified in the study area; most of them were observed in Tailings Option A and Tailings Option C (Figure 3.3-2 and Figure 3.3-3).



Plate 3.3-2. Bog* at site SW89.

Site Association Code: Bog* Wetland Class: Bog

Site Name: Unidentified Wetland Area: 0.51 ha

Site Description:

An unidentifiable bog community was observed at SW89 along the proposed road. A survey was not conducted at this site due to accessibility; and classification as a bog class wetland cannot be confirmed. This community is a treed seepage site at the toe of a slope. It is suspected as a bog community because confierous tree species dominate the tree layer. The only other wetland class with significant tree cover is swamp; however, most swamp associations are dominated by tall shrubs and broadleaf trees, rather than confiers.



















Plate 3.3-3. Wb01 Bog at site SW5.

Site Association Code:	Site Name:
Wb01	Spruce – Creeping-snowberry – Peat-moss
Wetland Class:	Wetland Area:
Bog	0.48 ha
Site Description:	

These bogs are uncommon in the boreal and sub-boreal forests at elevations between 500 and 1,000 m. They form in closed basins and in complexes with larger peatlands where there is little influence from groundwater (MacKenzie and Moran, 2004). This bog association was identified in Tailings Option C at 847 m in a complex with a Wf02 fen. Plate 3.3-3 shows the Wf02 fen in the foreground and the Wb01 bog approximately 20 m back. The vegetation is dominated by *Picea* and *Ledum groenlandicum*, which grow on raised microsites. The moss layer is dominated by *Sphagnum spp*. The soil is fibric *Sphagnum* peat and the soil nutrient regime is moderate. The hydrodynamic index is stagnant, soil water pH is approximately 6.5, and the soil moisture regime is very wet. A wildlife tree and well used game trail were observed in this community.



Plate 3.3-4. Wb02 Bog at site SW13.

Site Association Code:	Site Name:
Wb02	Lodgepole pine – Bog rosemary – Peat-moss
Wetland Class:	Wetland Area:
Bog	1.9 ha
Site Description:	

These bogs are scattered throughout the central and sub-boreal interior below 1100 m. They occur in closed basins, in isolated zones in larger peatlands and around acidic peatland lakes (MacKenzie and Moran, 2004). This bog association was identified in Tailings Option C. *Pinus contorta* is a constant dominant, though other tress species are often present as well. Small shrubs such as *Kalmia microphylla* are common and often *Empetrum nigrum* is found on raised microsites. Soils are typically deep *Sphagnum* peat. The soil nutrient regime is generally poor, the hydrodynamic index is stagnant to sluggish, soil water pH is typically < 5.5, and the soil moisture regime is very wet.



Plate 3.3-5. Wb05 Bog at site SW28.

Site Association Code:	Site Name:
Wb05	Spruce – Water sedge – Peat-moss
Wetland Class:	Wetland Area:
Bog	8.32 ha
Site Description:	

These bogs are common throughout the sub-boreal and central interior below 1,300 m. They occur as components of larger peatlands or in small closed basins where there is little lateral and groundwater movement and water table depression (MacKenzie and Moran, 2004). This association was surveyed in Tailings Option A. Sites are hummocky with trees and common bog species growing on elevated *Sphagnum* mounds. Soils are typically sedge-derived mesisols. The soil nutrient regime is generally moderate, the hydrodynamic index is stagnant to sluggish, soil water pH is typically < 7.0, and the soil moisture regime is very wet.



Plate 3.3-6. Wb07 Bog at site SW18.

Site Association Code:	Site Name:
Wb07	Lodgepole pine – Water sedge – Peat-moss
Wetland Class:	Wetland Area:
Bog	2.47 ha
Site Description:	

These bogs are uncommon in the interior below 1,600 m. They occur in closed basins or in the peripheral areas of larger peatlands where there is some groundwater influence (MacKenzie and Moran, 2004). Three of these ecosystems were identified in Tailings Option A. *Pinus contorta* and other coniferous tree species are common. *Ledum groenlandicum* and *Carex aquatilis* are characteristic species in the understory. Soils are typically deep fibric or mesic sedge peat. The soil nutrient regime is moderately poor to medium, the hydrodynamic index is stagnant, soil water pH is typically < 7.0, and the soil moisture regime is very wet.



Plate 3.3-7. Wb13 Bog at site SW53.

Site Association Code:	Site Name:
Wb13	Shore sedge – Buckbean – Peat-moss
Wetland Class:	Wetland Area:
Bog	0.61 ha
Site Description:	

These bogs are uncommon in costal transition regions below 1,600 m. They occur as components of larger peatlands and occupy the wettest portions (MacKenzie and Moran, 2004). *Carex limosa* and *Menyanthes trifoliata* are constant dominants. The moss layer is dominated by *Sphagnum spp*. The soil is *Sphagnum* peat; depth was difficult to measure at this particular site because this community is a series of floating peat mats in a complex with a Wf04 fen. The soil nutrient regime is very poor, the hydrodynamic index is stagnant, soil water pH is < 6.0, and the soil moisture regime is very wet.

3.3.2 Fen

A fen is a nutrient-medium peatland ecosystem dominated by sedges and brown mosses, where mineral-bearing groundwater is within the rooting zone and minerotrophic plant species are common (MacKenzie and Moran, 2004). Fens can have fluctuating water tables and are often rich in dissolved minerals. Surface water flow can be direct through channels, pools and other open features that can often form characteristic surface patterns. The vegetation in fens is closely related to the depth to and chemistry of groundwater. Shrubs occupy drier sites and minerotrophic graminoid vegetation is typically found in wetter sites (Warner and Rubec, 1997). A total of 10 fens were observed throughout the study area (Figures 3.3-2 through 3.3-7); however, most were observed in Tailings Option A.



Plate 3.3-8. Fen* at site SW86.

Site Association Code:
Fen*
Wetland Class:
Fen

Site Description:

Plate 3.3-9. Fen* at site SW94.

Site Name: Unidentified Wetland Area: 113.86 ha

Two unidentifiable fen communities were observed along the proposed road. These communities were not surveyed due to accessibility. They are large leaved fen complexes, likely of the Wf01 association. Wf01 fen complexes are some of the most common wetland associations in the province and occupy a variety of ecological niches. These wetlands are associated with the Mess Creek wetland complex and likely function as riparian area ecosystems even though they are several hundred meters from the main channel. Both sites are located at the toe of steep mountainous slopes and likely receive water from surface runoff, groundwater intrusion, and flood inundation.







gis no. 831-1-03d

Job No. 831-1

February 18, 2008





Job No. 831-1





Job No. 831-1





Job No. 831-1





Plate 3.3-10. Wf01 Fen at site SW76.

Site Association Code:	Site Name:
Wf01	Water sedge – Beaked sedge
Wetland Class:	Wetland Area:
Fen	6.82 ha

The Wf01 fen site association is the most common fen in British Columbia. It can occupy all but the warmest and driest subzones from low to subalpine elevations. They can be found in basins and hollows, seepage slopes, potholes, fluvial, and lacustrine systems (MacKenzie and Moran, 2004). Two sites of this association were surveyed in the Pit area and Tailings Option B. Species diversity is low; Carex aquatilis and Carex utriculata dominate the herb layer. Shrubs are present on the periphery and species diversity is higher when sites are "meadow like" with little standing water. The soil is fibric sedge peat and the soil nutrient regime is moderately poor. The hydrodynamic index is sluggish to mobile, soil water pH ranges from between approximately 6.7 and 7.7, and the soil moisture regime is very wet. A wildlife tree and well used game trail were observed in this community.



Plate 3.3-11. Wf02 Fen at site SW3.

Site Association Code:	Site Name:	
Wf02	Scrub birch – Water sedge	
Wetland Class:	Wetland Area:	
Fen	47.83 ha	

This fen association is common throughout the interior. It is often a major component of larger peatlands where there is some water table fluctuation (MacKenzie and Moran, 2004). This association was the most common association surveyed in the study area, with 20 distinct communities identified throughout Tailings Option A, Tailings Option C, the Saddle, and The Pit area. *Betula nana* and *Carex aquatilis* are characteristic but other shrubs (*Salix spp.*) can also be present. Soils are typically deep sedge derived peat, though organic veneers are occasionally present. The soil nutrient regime is moderately poor to medium, the hydrodynamic index is stagnant to mobile, the average soil water pH is 6.5, and the soil moisture regime is very wet.



Plate 3.3-12. Wf04 Fen at site SW54.

Site Association Code:	Site Name:
Wf04	Barclay's willow – Water sedge – Glow moss
Wetland Class:	Wetland Area:
Fen	32.41 ha
Site Description:	

These fens are common at subalpine elevations of the sub-boreal interior. They typically occur on seepage slopes, along glacier fed creeks, and in frost prone basins (MacKenzie and Moran, 2004). A total of 14 of this association were surveyed in Tailings Option A, the saddle, and Pit area. Sites are dominated by *Salix barclayi*, and *Carex aquatilis*. Other forbs such as *Caltha leptosepala*, *Eriophorum angustifolium*, and *Leptarrhena pyrolifolia* can be present at higher elevation sites. Soils are typically sedge-derived shallow peat mesisols. The soil nutrient regime is moderately poor to moderately rich, the hydrodynamic index is stagnant to mobile, the average soil water pH is 6.5, and the soil moisture regime is very wet.



Plate 3.3-13. Wf05 Fen at site SW36.

Site Association Code:	Site Name:
Wf05	Slender sedge – Common hook-moss
Wetland Class:	Wetland Area:
Fen	0.83 ha
Site Description:	

These fens are common throughout the interior below 1,400 m. They typically form on peat flats surrounding small lakes, ponds, and infilled palustrine basins. Prolonged shallow surface flooding and peat saturation are typical (MacKenzie and Moran, 2004). Two of these communities were surveyed in Tailings Option A. Carex lasiocarpa dominates but other large water sedges such as c. aquatilis are also common. Salix spp. and Betula nana were observed scattered throughout and along the periphery. The soils are deep peat mesisols and are very saturated. The soil nutrient regime is moderately poor to moderately rich, the hydrodynamic index is stagnant, soil water pH is typically between 6.5 and 7.5, and the soil moisture regime is very wet.



Plate 3.3-14. Wf07 Fen at site SW1.

Site Association Code:	Site Name:
Wf07	Scrub birth – Buckbean – Shore sedge
Wetland Class:	Wetland Area:
Fen	6.19 ha
A 1. A 1.1	

This association occurs throughout the central and sub-boreal interior at middle elevations in palustrine basins, hollows, and fluvial systems where there is a permanently high water table (Mackenzie and Moran, 2004). Four of these associations were surveyed in Tailings Option A and one was surveyed in Tailings Option C. Betula nana and Salix spp. are scattered through the sites and Carex limosa and other small leafed sedges are common. Menyanthes trifoliata occupy inundated depressions within the wetlands. The soil is Carex/Sphagnum peat > 1 m deep. The soil nutrient regime is moderately poor to medium, the hydrodynamic index is stagnant to sluggish, soil water pH ranges between 5.9 and 7.0, and the soil moisture regime is very wet.



Plate 3.3-15. Wf08 Fen at site SW80.

Site Association Code:	Site Name:
Nf08	Shore sedge – Buckbean – Hook-moss
Wetland Class:	Wetland Area:
Fen	6.8 ha

This fen association is uncommon throughout the interior; it occurs at higher elevations (700-1,800 m) in colder subzones. These ecosystems occur on pond-side floating mats, basins, and seepage slopes (MacKenzie and Moran, 2004). Three of these sites were surveyed in the study area; one in Tailings Option A, One in Tailings Option C, and one in the Saddle area. Carex limosa and Menyanthes trifoliata are constant dominants. The soils are fibric to mesic sedge and brown moss peat deposits > 0.5 m deep. The soil nutrient regime is moderately poor to medium, the hydrodynamic index is stagnant, soil water pH is between 6.7 and 7.2, and the soil moisture regime is very wet.

Site Description:



Plate 3.3-16. Wf10 Fen at site SW24.

Site Association Code:	Site Name:
Wf10	Hudson Bay Clubrush – Red hook-moss
Wetland Class:	Wetland Area:
Fen	7.97 ha

These fens are rare and generally only occur in the moist subzones of the Sub-Boreal Spruce (SBS). They occur where the water table is stagnant and is at or slightly above the peat surface (MacKenzie and Moran, 2004). The communities surveyed in the study area are not true Wf10 fens. They vary slightly in vegetation composition, site pH, and nutrient availability. The Wf10 ecosystems in the study area are dominated by *Trichophorum cespitosum* instead of *T. alpinum*. Five of these ecosystems were surveyed in Tailings Option A. Soils are typically sedge-derived peat fibrisols. The soil nutrient regime is very poor to medium, the hydrodynamic index is stagnant to sluggish, the average soil water pH is approximately 6.8, and the soil moisture regime is very wet.



Plate 3.3-17. Wf12 Fen at site SW68.

Site Association Code:	Site Name:
Wf12	Narrow-leaved cotton-grass – Marsh-
Wetland Class:	marigold
Fen	Wetland Area:
	22.88 ha

These fens are common at subalpine elevations throughout the sub-boreal interior. They occur on gently slopping peatlands where there is continual seepage from snowmelt and groundwater (MacKenzie and Moran, 2004). Five of these communities were identified in the Saddle area. Eriophorum angustifolium is dominant as is Caltha leptosepala. The moss layer is well developed but variable. The soils are deep spongy peat mesisols and are very saturated. The soil nutrient regime is moderately poor to medium, the hydrodynamic index is stagnant to sluggish, soil water pH is typically between 5.5 and 6.5, and the soil moisture regime is very wet.



Plate 3.3-18. Wf13 Fen at site SW79.

Site Association Code:	Site Name:
Wf13	Narrow-leaved cotton-grass – Shore sedge
Wetland Class:	Wetland Area:
Fen	1.77 ha
Site Description:	

This association occurs at higher elevations in depressions or gradual seepage slopes where standing water persists for most of the growing season (MacKenzie and Moran, 2004). Two of these associations were surveyed in the study area; one in Tailings Option A and on in Tailings Option B. The community is typically *Eriophorum angistifolifum* and *Carex limosa*, although other forbs are present in different soil saturation conditions. The soil at these sites is typically deep, mesic peat with cotton-grass remains. The soil nutrient regime is moderately poor, the hydrodynamic index is stagnant, soil water pH is approximately 6.0, and the soil moisture regime is very wet.

3.3.3 Marsh

A marsh is a permanently to seasonally flooded non-tidal mineral wetland dominated by emergent grass-like vegetation (MacKenzie and Moran, 2004). Marshes are the most heavily used wetland type for most wetland-using wildlife species. They are typically eutrophic and support large standing crops of palatable vegetation, plankton and aquatic invertebrates. They are the favoured wetland class for most waterfowl, amphibians and semi-aquatic mammals because they provide good cover, open water and food. Soils are typically mineral but can also have a well decomposed organic surface tier (Warner and Rubec, 1997; MacKenzie and Moran, 2004). Two marsh association was observed in the study area; the majority of these marshes were surveyed along the road (Figure 3.3-6 and 3.3-7).



Plate 3.3-19. Marsh* at site SW92.

Site Association Code:	Site Name:
Marsh*	Unidentified
Wetland Class:	Wetland Area:
Marsh	0.06 ha

An unidentifiable marsh community was observed at SW92 along the proposed road. A survey was not conducted at this site due to accessibility; although, through the aerial survey, vegetation and structural components consistent with a Wm01 marsh were identified. However, classification is not carried to the association level and reflects the uncertainty of the data set. This community is a flood controlled large sedge dominated ecosystem. Flooding from Mess Creek and shallow groundwater reserves are likely the driving hydrological factors maintaining this community. A shrub dominated flood association or a swamp association are in complex with this marsh, located immediately upstream (lower left corner in Plate 3.3-19).



Plate 3.3-20. Wm01 at site SW42.

Site Association Code:
Wm01
Wetland Class:
Marsh
Site Description:

Site Name: Beaked sedge – Water sedge Wetland Area: 120.84 ha

This association is the most widespread marsh association in the province. They are found from low to subalpine elevations in all BEC subzones on sites that that are inundated by shallow low energy flood waters, on the margins of beaver ponds, lake margins and palustrine basins. The majority of these sites were observed along the proposed road, though a few were also surveyed in the various tailings options. Species diversity is low; sites are dominated by *Carex utriculata* and *C. aquatilis*. Soils are typically gleysols. The soil nutrient regime is moderate, the hydrodynamic index is typically mobile to dynamic, the pH ranges from 6.5 to 7.7, and the soil moisture regime is very wet.

3.3.4 Swamp

A swamp is a nutrient-rich wetland ecosystem where significant groundwater inflow, periodic surface aeration and elevated microsites support the growth of trees and tall shrubs (MacKenzie and Moran, 2004). Generally there is more than 30% tree or tall shrub cover. Soils are often gleyed mineral soils with a surface layer of anaerobically decomposed woody peat. In general, there are three physically different swamp communities (shrub-thicket, coniferous forest, and hardwood (deciduous) swamps) (Warner and Rubec, 1997). Swamps have a more vertical structure than other wetland classes and support a more diverse avifauna (MacKenzie and Moran, 2004). Forested swamps typically have an open canopy that appears to be favoured by many

birds and bat species (MacKenzie and Moran, 2004; Lausen, 2006). Very few swamp ecosystems were observed in the study area, most of them observed in Tailings Option B (Figure 3.3-5).



Plate 3.3-21. Swamp* at site SW88.

Site Association Code:	Site Name:
Swamp*	Unidentified
Wetland Class:	Wetland Area:
Swamp	6.32 ha

Site Description:

An unidentifiable swamp community was observed at SW88 along the proposed road. A survey was not conducted at this site due to accessibility; although, through an aerial survey, vegetation and structural components consistent with a swamp class wetland were identified. This community is a flood controlled shrub dominated ecosystem and is likely similar to the shrub community associated with the marsh* site at SW92. Flooding from Mess Creek and shallow groundwater reserves are likely the driving hydrological factors maintaining this community. A sedge dominated marsh is in complex with this swamp, located between this community and the shrub dominated riparian area of Mess Creek (centre of Plate 3.3-21).


Plate 3.3-22. Ws04 at site SW2.

Site Association Code: Ws04 Wetland Class: Swamp

Site Description:

Site Name: Drummond's willow – Beaked sedge Wetland Area: 0.07 ha

This association is common in the central and sub-boreal interior and is often associated with fluvial systems. One of these wetland communities were observed in the study area in Tailings Option C. *Salix drummondiana* dominates with other shrubs present as well. The herb layer is dominated by *Carex aquatilis* and *Equisetum arvense*. Soils are a thin organic veneer over a gleyed mineral soil. The soil nutrient regime is moderate, the hydrodynamic index is mobile, the pH is approximately 7 and the soil moisture regime is very wet.



Plate 3.3-23. Ws06 at site SW74.

Site Association Code:	Site Name:
Ws06	Sitka willow – Sitka sedge
Wetland Class:	Wetland Area:
Swamp	0.58 ha
Site Description:	

Two of these communities were observed in Tailings Option B. This association is uncommon at low elevations in the Nass Basin and sub-boreal interior. Species diversity in the shrub layer is high with a number of *Salix spp.* identified. A number of *Carex* spp were also identified; however, *C. sitchensis* is the most common. Soils are typically gleysols overlain by thin layers of sedge dominated peat. The soil nutrient regime is moderately poor to moderate, the hydrodynamic index varies substantially from sluggish to dynamic, the pH ranges from 6.9 to 7.4, and the soil moisture regime is very wet.

3.3.5 Shallow Open Water

Shallow open water wetlands are ecosystems permanently flooded by still or slow-moving water and dominated by rooted and floating leaved aquatic plants. Shallow open water wetlands are often the transition from bogs, fens, marshes and swamps to permanent deep water bodies (*i.e.*, sluggish streams and lakes) (Warner and Rubec, 1997; MacKenzie and Moran, 2004). Shallow open water wetlands also include wetlands created and controlled by beavers (*Castor canadensis*). They are important habitat for wildlife and fish because of vegetation cover and high prey densities (MacKenzie and Moran, 2004). Sedimentation and nutrient loading are the biggest concern for shallow open water wetlands. Changes in turbidity block light penetration

and alter where rooted submerged aquatic vegetation can grow (MacKenzie and Moran, 2004). Shallow open water ecosystems were observed scattered throughout the study area and typically formed complexes with other wetland associations (Figures 3.3-2 through 3.3-7).

Two shallow open water ecosystems were identified as the primary community type in the wetland ecosystem study. The most common shallow open water community is dominated by the yellow pond lily (Plate 3.3-24). These sites exist throughout the study area as the primary community type in a wetland complex, the associated ecosystem in a wetland complex, and as a stand-alone wetland association. The other shallow open water community surveyed as the primary community type is a horsetail dominated pool in Tailings Option B (Plate 3.3-25).

Two other shallow open water communities were observed as the associated ecosystem in a wetland complex. One was a pond weed community dominated by *Potamogeton sp* (Plate 3.3-26). The other was a non-vegetated ecosystem, which are pools in peat wetlands where no submergent vegetation is growing (Plate 3.3-27).



Plate 3.3-24. Yellow Pond Lily community at site SW60.



Plate 3.3-25. Horsetail community at site SW78.



Plate 3.3-26. Pond Weed community at site SW47.



Plate 3.3-27. Non-vegetated shallow open water ecosystem at SW43.

3.3.6 Transition and Other Associations

There are many transition association and associated wetland associations likely present in the study area. These ecosystems are not wetlands because they lack the specific soil, vegetation, or water requirements to be classified as wetlands; however, they function in a similar manner and are often connected with wetland ecosystems. Two of the most common associated ecosystems observed throughout the study area are the Shrub-carr Sc03 Barclay's willow – Arrow-leaved groundsel and various flood associations.

The Sc03 community is common in the subalpine of the northern boreal mountains. They form extensive communities on moist to very wet soils. Barclay's willow is always present in Sc03 communities and the herb layer is often diverse but usually dominated by *Senecio triangularis* and *Valeriana sitchensis*. The soils are imperfectly drained mineral soils. Plate 3.3-28 is of a Shrub-carr community surveyed at SW34.

Various flood associations are connected with Schaft and Mess Creeks. These creek systems are dynamic systems and flooding occurs annually. The riparian communities along Schaft and Mess Creeks have developed to withstand this annual inundation. The flood associations of both rivers dominated by *Salix spp.* and they are often strongly connected with swamp associations or upland forest (Plate 3.3-29).



Plate 3.3-28. Shrub-carr community at SW34.



Plate 3.3-29. Flood association on Mess Creek connected to upland forest.

3.3.7 Rare Ecosystem Associations

This section presents a summary of ecosystems that were either listed on the provincial red/blue list or uncommon within the study area. Ecosystem survey notes were compared against information compiled by the B.C. Conservation Data Centre (CDC) for consideration as provincially rare ecosystems. This was done to ensure due diligence and to identify whether ecosystems in the study area have been classified by the BC Ministry of Environment as:

- Red Listed Any ecological community that is extirpated, endangered, or threatened in British Columbia (MOE, 2007).
- Blue Listed Any ecological community considered to be of Special Concern (formerly Vulnerable) in British Columbia (MOE, 2007).

Three blue listed fens and two blue listed bog associations were identified in the study area. Table 3.3-2 presents a summary of the rare ecosystem information.

	Summary of Rafe Wettand Ecosystems								
Class	Association Code	Location	Site	Area (ha)					
Fen	Wf05	Tailings Option A	SW36	0.44					
Fen	Wf05	Tailings Option A	SW37	0.39					
Fen	Wf08	Tailings Option A	SW48	0.87					
Fen	Wf08	Tailings Option C	SW80	1.00					
Fen	Wf08	Saddle	SW66	4.93					
Fen	Wf13	Tailings Option A	SW58	0.27					
Fen	Wf13	Tailings Option B	SW79	1.50					
Bog	Wb07	Tailings Option A	SW18	1.58					
Bog	Wb07	Tailings Option A	SW21	0.89					
Bog	Wb10	Tailings Option A	SW14	1.2					

Table 3.3-2Summary of Rare Wetland Ecosystems

3.4 Wetland Area

The area for each wetland association is presented in the association descriptions in section 3.3. This section summaries the wetland area for each wetland class and in each proposed mine feature. Wetland areas were estimated using TRIM GIS data. Where multiple wetland associations were surveyed in a single TRIM wetland polygon, high resolution satellite imagery was used to digitize distinct community types. Table 3.4-1 presents the wetland area for each wetland class including non surveyed TRIM wetlands. Table 3.4-2 presents the area of wetland communities inside the foot print of the proposed mine features.

Table 3.4-1

Wetland Area of each Wetland Class of the Schaft Creek Study Area

Wetland Class	Area (ha)
Bog	14.3
Fen	247.37
Marsh	120.0
Swamp	6.98
Shallow Open Water	2.51
TRIM Marsh	18.9
TRIM Swamp	432.26 ¹
TRIM Shallow Open Water	1.88
Total	844.2

¹ This area is large because the TRIM Swamp wetland data used to estimate this value likely includes riparian and flood associated ecosystems. Approximately 50% of this area was estimated from one TRIM Swamp polygon on Mess Creek.

Table 3.4-2Wetland Area in Proposed Mine Development Areas

Proposed Development Areas	Area (ha)
100 m of Mess Creek Access Option	662.01 ¹
150 m of Proposed Infrastructure (Runways, roads, waste rock piles, plant sites, <i>etc.</i>)	67.0
Tailings Option A	97.64
Tailings Option B	6.61
Tailings Option C	11.62

¹ This area is large because the TRIM Swamp wetland data used to estimate this value likely includes riparian and flood associated ecosystems. Approximately 30% of this area was estimated from one TRIM Swamp polygon on Mess Creek.

3.5 Wetland Wildlife Observations

A number of wildlife and wildlife features were observed in wetlands in the study area. Table 3.5-1 presents the wildlife species/ feature observed and the location.

These species and features are incidental observations and part of a scientific survey. For complete wildlife results refer to Rescan (2007a), Rescan (2007b), Rescan (2007c), and Rescan (2008c).

Table 3.5-1	
Wildlife Observations from Schaft Creek Study Area Wet	lands

Plot	Location	Species or Feature
SW3	Tailings Option C	Wildlife Tree
SW4	Tailings Option C	Columbia Spotted Frog
SW5	Tailings Option C	Game Trail/Wildlife Tree
SW11	Tailings Option C	Game Trail
SW13	Tailings Option C	Game Trail
SW14	Tailings Option A	Game Trail
SW23	Tailings Option A	2 Columbia Spotted Frogs
SW26	Tailings Option A	Moose
SW28	Tailings Option A	Game Trail
SW29	Tailings Option A	Columbia Spotted Frog
SW35	Tailings Option A	Beaver Dam/Pond
SW37	Tailings Option A	Game Trail to Open Water
SW41	Tailings Option A	Mud wallow
SW47	Tailings Option A	Wildlife Tree
SW49	Tailings Option A	Columbia Spotted Frog
SW54	Tailings Option A	Columbia Spotted Frog
SW61	Saddle	Western Toad and Columbia Spotted Frog
SW65	Saddle	Columbia Spotted Frog
SW66	Saddle	Tadpoles (Western Toad)
SW73	Tailings Option B	Waterfowl ¹
SW77	Tailings Option B	Beaver
SW78	Tailings Option B	Game Trail to Open Water
SW83	Pit	Game Trail (Beaver and Moose sign)
SW85	Pit	Beaver Dam/Pond

¹ Waterfowl were observed at a number of shallow open water features



4. Discussion

Wetland functions and values are described following Environment Canada (2003) (Section 2.5.2). The survey results from the ecosystem survey, hydrology survey, and aquatic biological sampling are considered within the context of known current and traditional land uses to describe functions and identify wetland value.

Current land uses within the Project area included active guide outfitting and trapping. These activities generate revenue for local communities and maintain culturally important traditions (Rescan 2007d). The Project area is also adjacent to Mount Edziza Provincial Park. Although this park is remote and receives few visitors every year, it does provide important recreational activities in the area (MOE, 2008).

4.1 Wetland Functions and Values

4.1.1 Wetland Functions

The field data collected during the hydrology survey, ecosystem assessment, and aquatic biology sampling were selected to identify the functions of wetlands in the study area. Table 4.1-1 shows which wetland functions are described by the field data.

Wetland Function	Fieldwork Component
Hydrological Function	Hydrology monitoring and
	Ecosystem survey (Hydrodynamics)
Biochemical Function	Aquatic Biology(Sediment and water quality)
	Ecosystem Survey (Soil Water pH and Soil Horizon Identification)
Ecological Function	Aquatic biology (Productivity) and Ecosystem survey (Classification)
Habitat Function	Fisheries Sampling/Habitat Assessment and Ecosystem survey (Classification and Wildlife observations)

Table 4.1-1Wetland Function and Associated Fieldwork Component

4.1.1.1 Hydrological Function

The hydrological function of a wetland is described as a wetlands ability to regulate water contributions to and from surface and groundwater reserves. The hydrological function is quantified through hydrological surveys at a sample of wetlands and ecosystem observations. Ecosystem observations incorporate two indicators to describe hydrological function:

- 1. Minerotrophic plant species (The presence of minerotrophic species indicates mineral rich groundwater is supplying the wetland with water.)
- 2. Hydrodynamic index (This index categorizes the amounts of vertical and horizontal movement of water at a site. The index rating is arrived at through observations of surface erosion, soil pit infiltration and mineral leaching in soil layers.)

Continuous water level monitoring at SC wetland indicates that the water level rose above the ground level numerous times throughout the monitoring period. A comparison with the precipitation data suggests that increases in the SC wetland are due to precipitation events. It also takes approximately 7-10 days for water levels to recede to pre-precipitation event levels. The continuous water level monitoring data from the MC wetland is slightly different; it shows that water levels do not change dramatically after precipitation events, indicating that water from precipitation quickly infiltrates into the ground or enters Mess Creek.

Wetlands in the study area play a prominent role in the regions hydrology. They store water and buffer the surface water environment from flooding, providing flood protection and erosion control benefits. Riparian area and wetlands with shallow open water features regulate surface water while small terrestrial fens, marshes and swamps regulate water contributions to groundwater. Plate 4.1-1 shows water seeping from a fen into Tailings Option C Creek.



Plate 4.1-1. Water seeping from a Wf07 Fen into Tailings Option C Creek.

Wetlands help maintain the level of the water table and exert control on the hydraulic head, which provides the force for groundwater recharge and discharge. The extent of groundwater recharge by a wetland is dependent upon its soil, vegetation, site, perimeter to volume ratio and water table gradient. A high perimeter to volume ratio, such as in small fen wetlands, means that there is a large surface area through which water can infiltrate into the groundwater. Groundwater recharge of up to 20% of wetland volume per season is typical (Turner and Gannon, 2003).

4.1.1.2 Biochemical Function

Biochemical function is defined as a wetland's contribution to the quality of surface water and groundwater. This function is identified through sediment and water sampling as well as through field pH measurements and soil horizon identification.

Particle size analysis shows that the bedload of most wetlands is dominated by silt. Wetlands are known for their filtration properties and have often been constructed as a passive water purification measure (Hammer, 1989). As sediments and particles settle out in the slow moving wetland water, nutrients, metals and toxins bound to these particles also settle out. Plants, microorganisms and chemical processes specific to wetlands help to breakdown, sequester and metabolize nutrients, metals and toxins, effectively removing them from the larger surface water network and facilitating the energy transfer of nutrients from aquatic species to terrestrial ecosystems.

Wetlands in the study area play a prominent role in the aquatic biochemical cycle. They remove sediments and prevent metals trapped within those sediments from being released into the larger aquatic environment.

4.1.1.3 Ecological Function

Ecological function is the role of the wetland in the surrounding ecosystem. It is qualified through aquatic biology productivity sampling and through ecosystem structure observations during the ecosystem classification.

Wetlands in the study area are strongly connected with the upland environment and often form complexes of multiple wetland associations before transitioning into upland environments. There are a number of beaver controlled shallow open water wetlands with various marsh associations occupying the more shallow water near the shore. These marsh associations then transition into tall shrub and forested swamp associations before eventually drying out and becoming upland forest.

The aquatic biology study found that wetlands and stream sites have similar levels of primary productivity as identified through genus richness and the Simpson diversity index. However, wetland sites have more dense benthic communities and slightly more secondary production genera. This underlies the difference between stream and wetland aquatic habitat. Given that wetlands play a significant role in providing habitat for a number of organisms, it is not a component of the ecological function that all wetlands have higher primary and secondary productivity than streams. It is rather the diversity between wetland and stream aquatic communities that lead to an ecologically strong environment. The ecological function is supported through a diversity of aquatic habitats.

Wetlands in the study area have many important ecological functions. They typically are an integral part of an important water drainage system. They often form complexes with several types of wetland associations but maintain a similar level of productivity, thereby offering various types of habitat and different ecological niches.

4.1.1.4 Habitat Function

The habitat function is the terrestrial and aquatic habitat provided by wetlands. It is identified during fisheries sampling and fish habitat assessments and through wildlife observations during the ecosystem survey.

The study area fens provide important browse habitat for moose and bears. In the summer, moose will also feed upon aquatic vegetation such as lily (*Nuphar spp.*) rhizomes and pondweed (*Potamogeton spp.*) that grow in marshes and shallow water wetlands (Belovsky and Jordan, 1981). Moose also visit marshes and shallow water wetlands in the summer to cool off and escape from insect pests (Flook, 1959; Renecker and Hudson, 1986). In the winter, willows (*Salix spp.*) found in many of the study area's fens (Wf04) and swamps, provide valuable forage for moose.

Wetlands in the study area provide habitat for many mammals, birds, reptiles, amphibians, molluscs, crustaceans, invertebrates, fish and plants. The wetlands provide food, cover, rearing and nesting and migration habitats for a multitude of species. Wetlands also function to maintain other habitats by protecting natural shorelines from erosion. Wetlands provide critical early spring forage habitat for moose and bears and habitat for the western toad, a COSEWIC species of special concern.

In addition to providing habitat to species of concern, five provincially blue-listed wetland ecosystems were identified in the study area. These ecosystems are of special concern because they represent communities that are potentially vulnerable or not common throughout the province. Project planning and development should follow best practices so that the habitat function to species and ecosystems of special concern is maintained.

4.1.2 Wetland Values

4.1.2.1 Commercial and Social/Cultural

There are a number of direct and indirect commercial uses for wetlands in the study area. The most direct commercial use is trapping. There are a number of trap lines operated in close proximity to the study area that provide individuals and small communities with a financial resource base. Some of the species trapped completely rely on wetlands (beaver); other species use wetlands more opportunistically. Other commercial uses of wetlands include guided hunting. Some of the species sought during guiding use wetlands for portions of their respective life cycles (*i.e.*, moose). Moose and bears are popular species associated with hunting activities and both species rely on wetlands for forage. Without the habitat functions provided by wetlands, their commercial value would not be realised.

Wetlands in the study area have a social and cultural value. The social/cultural value was identified because the most popular big game species for resident and First Nation hunters is moose. Moose are very dependant on wetlands. The hunting of moose allows for the preservation of social and cultural values for both First Nation and commercial hunters and provides sustenance for a number of families. Although the area is generally inaccessible, there are a few active guide outfitting and trapping tenures in the area and the cultural values

associated with these activities is important to the local community (Rescan, 2006). Without the habitat and ecological functions, the social and cultural values of wetland habitats would not be realised.

4.1.2.2 Maintenance of Ecosystem Health

Hydrological

Wetlands are an important part of the study area's hydrologic cycle, including both surface water and groundwater. As observed in the continuous hydrologic monitoring, water is absorbed by the wetland SC and held as shallow groundwater; it is then released slowly after precipitation events into the surface water network or into shallow groundwater reserves. This holding capacity prevents excessive runoff from overwhelming the local surface drainage network. It is likely that deeper groundwater reserves are also recharged as shallow groundwater percolates downward to these areas.

The hydrologic function of wetlands within the study area contributes to the creation of unique and varied habitats. Changes to wetland hydrology may result in shifts in floral and faunal species composition, which could in turn further affect the hydrology of the surrounding ecosystems (Martin and Chambers, 2001; Price and Whitehead, 2001).

Biodiversity and Habitat

Wetlands maintain ecosystem health through the biodiversity, habitat, and wildlife they support. The ability of wetlands to provide different aquatic habitat from stream networks strengthens the diversity in the aquatic environment. Wetlands also provide a wide variety of ecosystems in the study area, allowing for the development and specialization of floral and faunal communities. Five provincially listed wetland ecosystems were found in the study area as well as the western toad, a COSEWIC species of special concern. The observation of these communities and species highlights the value wetlands have with respect to biodiversity and the maintenance of ecosystem health.



5. Summary

A total of 97 wetland sites were surveyed in July, 2007. A further 34 wetlands were identified and mapped using available TRIM GIS data for a total of 131 mapped wetland communities within the study area. All five federally recognized wetland classes were surveyed in the study area (bog, fen, marsh, swamp, and shallow open water) and many of the wetland communities were found to be in a wetland complex (more than one wetland community type). The fen wetland class was the most abundant in the study area representing approximately 62% of all wetlands surveyed. Fens also covered the largest area of surveyed wetlands, covering approximately 246 ha. TRIM swamp wetlands accounted for the largest overall area (approximately 432 ha); however, almost 50% of this area was represented by one wetland near Mess Creek which likely includes Shrub-carr transition associations and willow dominated flood associated riparian ecosystems.

Wetlands are distributed evenly throughout the study area, with the exception of the proposed Mess Creek access option. A larger area of wetlands was identified in the Mess Creek access option because Mess Creek is a dynamic river system and large tracts of wetland and riparian flood ecosystems cover the Mess Creek valley floor. Although any potential development in this zone is likely to be limited to the access road, all wetland communities contained entirely or partially within a 100 m buffer of the road were mapped. Aside from the Mess Creek access road option, Tailings Option A has the largest area of wetland ecosystems (approximately 98 ha). Tailings Option A contains a variety of wetland classes and associations; however, fen wetlands were the most dominant.

A total of five provincially blue-listed wetland ecosystem associations were surveyed in the study area; and all five of them were identified in Tailings Option A. The five blue-listed wetland ecosystems are designated by British Columbia as an ecological community of special concern and included three fen associations and two bog associations. The Wf08 and Wf13 fen associations, on the blue-list, were also identified in the Saddle and Tailings Option B areas, respectively.

A variety of wildlife and wildlife features were also identified in or near wetlands of the study area. A total of 4 moose sightings occurred while surveying wetlands in Tailings Option A and an active beaver pond/lodge was also observed in this zone. A number of frogs were observed in wetlands in Tailings Option A and the Saddle areas. The western toad (*Bufo boreas*), a species of special concern (COSEWIC, 2003), was also observed in the Saddle area. Lastly, a well used mud wallow and a number of wildlife trees were also observed in the Tailings Option A area.

5.1 Wetland Hydrology

The four monitored wetlands are considered to be typical of wetlands in the Schaft Creek Project area. Data collected as part of the wetland hydrology monitoring program can be used to infer the hydrology of wetlands throughout the Project area.

By definition, wetlands have shallow water tables. Observed water levels of the monitored wetlands ranged from approximately 0.5 m below the ground surface to being above the ground surface as ponds and streams.

The water table in each wetland was observed to fluctuate throughout the monitoring period in response to hydrological inputs, such as rainfall and snow melt. Wetland water table levels are expected to be highest after the spring snow melt period, which will generally occur in late May or early June and result in substantial areas of open water. High water levels are also expected in September and October, which are normally the wettest months of the year. Lowest annual water table levels are expected to occur in the late summer, after snow pack from the previous winter has been depleted and prior to the commencement of the wet fall period.

5.2 Wetland Aquatic Biology

Water and sediment quality varied substantially between wetland sites, highlighting the biogeochemical diversity of wetlands. Turbidity was relatively low in most wetlands, supporting the claim that wetlands act as water filters and purifiers. A number of metals exceeded various environmental quality guidelines in both water and sediment; however, these excess metal concentrations were spread relatively evenly between wetlands and no discernable pattern was observed.

Generally wetlands exceeded water quality guidelines for organic parameters more often than stream sites; however, stream sites exceeded metals guidelines substantially more than wetlands (Rescan 2008a). Total nitrogen and TOC concentrations were generally higher in wetland sediments compared to stream sediments and the same metals (AS, Cr, Cu, Fe, Ni, and Zn) exceeded guidelines in both stream and wetland sediments, with the exception of Hg. Mercury only exceeded environmental quality guidelines in stream sites.

Productivity, as measured by primary production communities was highest at WL11 (Figure 2.3-1); however, diversity as measured by the Shannon and Simpson diversity indices did not vary widely between wetlands. This uniformity of primary production indicates that all wetlands in the study area have the same level of function when it comes to productivity. In addition, the genus richness and Simpson diversity indices are approximately the same between wetland and stream sites. This suggests a level of uniformity in all aquatic habitats with respect to primary production.

The uniformity of the productivity function between wetlands is supported by the results from the secondary community samples. Results show that there was little variation between wetlands and their corresponding Shannon and Simpson diversity indices for secondary production communities. Benthic community densities and genus richness are higher in wetlands than stream sites. However, the Simpson diversity index is roughly the same between wetland and stream sites, although it is much more variable in the streams (Rescan, 2008a). This shows that, although primary production communities are roughly the same between stream and wetland sites, the secondary production communities in wetlands are more dense, have greater genus richness and are less variable than stream sites. These data show that there is a uniformity of primary and secondary productivity within wetlands, and that wetlands in the study area have similar levels of biological function.

5.3 Wetland Function and Value

Wetlands in the study area carry out the four wetland functions as identified by Environment Canada (2003) (section 2.5.5). There are a variety of wetland associations in the study area and these wetlands tend to function to different degrees. The wetland complexes associated with Mess and Schaft Creeks tend to have a more important flood control hydrological function than do the fen wetlands in Tailings Option A, which function more as a source for water recharge rather than flood control.

There is a level of uniformity between wetlands surveyed for aquatic biology, which indicates that different wetland classes in the study area have similar ecological and biochemical functions. The wetlands surveyed had similar levels of benthic diversity and that diversity tended to be greater than in stream sites. This difference in benthic diversity highlights the ecological importance of wetland habitats in maintaining biodiversity, *e.g.*, wetland dependent flora and fauna, in the study area.

A number of species/ecosystems of concern were also identified in the study area illustrating the ecological function of wetland habitat within the study area. The diversity of wetland habitat and their higher secondary producer diversities support wetland contributions to habitat for species of concern and the development and maintenance of ecosystems of concern.

These functions coupled with known land use practices support two primary wetland values. The first value identified is the commercial and social/cultural value. Wetlands support wildlife habitat for species such as moose, bears, and beaver; all of which are important wildlife species for trapping and guide outfitting. The longevity of wetland ecosystems will ultimately maintain these wildlife populations for recreational activities, which in turn generates revenue for local communities. The continued harvest of these species also maintains social and cultural practices for native and resident hunters as well as outdoor enthusiasts.

The second value identified, maintenance of ecosystem health, is more difficult to quantify as it is realised by a social impetus for the maintenance of healthy ecosystems and the continuation of species and ecosystems of concern. The maintenance of ecosystem health value is supported by wetland hydrology and biodiversity. Hydraulically functioning wetlands maintain ecosystem health by buffering surface water systems, such as Mess and Schaft Creeks, from flooding events which could have negative down stream implications. They also maintain water flow throughout the summer months by acting as a sponge in the spring seasons and slowly releasing water in to groundwater reserves and the surface water environment throughout the summer, such as the fen wetlands in Tailings Option A. The biodiversity of wetlands in the study area also maintain ecosystem health by supporting a variety of habitat for culturally important species (moose, bears and beaver) and species of concern (western toad). The variety of wetland habitat supports biodiversity, through the maintenance of ecosystems of concern and ultimately the overall maintenance of ecosystem health.

- Belovsky, G.E. and P.A. Jordan. 1981. Sodium dynamics and adaptations of a moose population. *Journal of Mammalogy*, 62: 613-621.
- Canada Soil Survey Committee (CSSC). 1987. *The Canadian System of Soil Classification*. 2nd ed. Agriculture Canada. Ottawa, Ont. Publ. 1646.
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2003. COSEWIC Assessment and Status Report in the Western Toad *Bufo Boreaus* in Canada. Minister of Public Works and Government Services Canada.
- Costanza, R., R. d'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R.V. O'Neill, J. Paruelo, R.G. Raskin, P. Sutton and M. van den Belt. 1997. The value of the world's ecosystem services and natural capital. *Nature*, 387:253-260.
- British Columbia Ministry of Environment. 2005. Wetlands in B.C. http://www.env.gov.bc.ca/wld/wetlands.html.
- Douglas, G.W., D. Meidinger, J. Pojar. 2001. *Illustrated Flora of British Columbia*. Ministry of Environment Lands and Parks. Victoria B.C. Volumes 1-6.
- Environment Canada. 2003. Wetland Environmental Assessment Guideline. Government of Canada. Accessed from: http://www.cws-scf.ec.gc.ca/publications/eval/wetl/index_e.cfm.
- Flook, D.R. 1959. Moose using water as a refuge from flies. Journal of Mammology, 40: 455.
- Green, R.N., R.L. Trowbridge, and K. Klinka. 1993. Towards a Taxonomic Classification of Humus Forms. *For. Sci. Monogr.* 29.
- Hammer, D.A. 1989. Constructed Wetlands for Wastewater Treatment: Municipal, Industrial, and Agricultural. Lewis Publishers. Chelsea, Michigan.
- Johnson, D., L. Kershaw, A. MacKinnon, and J. Pojar. 1995. *Plants of the Western Boreal Forest and Aspen Parkland*. Lone Pine Publishing and the Canadian Forest Service. Canada.
- Lausen, C. 2006. Bat Survey of Nahanni National Park Reserve and Surrounding Areas, Northwest Territories. Prepared for: Parks Canada and Canadian Parks and Wilderness.
- Luttmerding, H.A., D.A. Demarchi, E.C. Lea, D.V. Meidinger, and T. Vold. (editors). 1990. *Describing Ecosystems in the Field*. Second edition. B.C. Min. Env., Lands and Parks and B.C. Min. of For.,MOE Manual 11. Victoria, B.C.
- MacKenzie, W.H. 1999. *Field Description of Wetlands and Related Ecosystems in British Columbia.* Ministry of Forest Research Program. Victoria, B.C.
- MacKenzie, W.H. and J.R. Moran. 2004. *Wetlands of British Columbia: A Guide to Identification*. Ministry of Forest Research Program. Victoria, B.C. Land Management Handbook 52.

- Martin, D.W. and J.C. Chambers. 2001. Effects of water table, clipping and species interactions on Carex nebrascensis and Poa pratensis in riparian meadows. *Wetlands* 21(3): 422-430.
- Ministry of Environment (MOE). 2007. BC Species and Ecosystems Explorer. Government of British Columbia. Accessed from: http://www.env.gov.bc.ca/bcparks/explore/parkpgs/mt_edziz/access.html#access
- Ministry of Environment (MOE). 2008. Mount Edziza Provincial Park. Government of British Columbia. Accessed from: http://www.env.gov.bc.ca/atrisk/toolintro.html
- Ministry of Environment, Land and Parks (MOELP). 1991. British Columbia Specifications and Guidelines for Geomatics. Content Series Vol. 4. Release 2.0. Province of British Columbia.
- Novitzki, R., D. Smith, and J. Fretwell. 1997. Restoration, Creation, and Recovery of Wetlands: Wetland Functions, Values, and Assessment. United States Geological Survey Water Supply Paper 2425. Accessed from: http://water.usgs.gov/nwsum/WSP2425/functions.html.
- Parish, R., R. Coupe, and D. Lloyd. 1996. Plants of Southern Interior British Columbia. B.C. Ministry of Forests and Lone Pine Publishing.
- Pojar, J. and A. MacKinnon. 1994. Plants of Costal British Columbia: Including Washington, Oregon and Alaska. B.C. Ministry of Forests and Lone Pine Publishing.
- Price, J.S. and G.S. Whitehead. 2001. Developing hydrologic thresholds for Sphagnum recolonization on an abandoned cutover both. *Wetlands*, 21(1): 32-40.
- Renecker, L.A. and R.J. Hudson. 1986. Seasonal energy expenditures and thermoregulatory responses of moose. *Canadian Journal of Zoology*, 64: 322 327.
- Rescan. 2006. *Schaft Creek 2006 Baseline Reports Socio-Economic and Land Use*. Prepared for CopperFox Metals Inc. by Rescan Environmental Services Ltd, April 2007.
- Rescan. 2007a. *Schaft Creek Bird Studies Baseline Report 2006*. Prepared for CopperFox Metals Inc. by Rescan Environmental Services Ltd, March 2006.
- Rescan. 2007b. *Schaft Creek Bat Inventory Report, 2007.* Prepared for CopperFox Metals Inc. by Rescan Environmental Services Ltd. December 2007.
- Rescan. 2007c. *Schaft Creek Project 2006 Moose Baseline Report*. Prepared for CopperFox Metals Inc. by Rescan Environmental Services Ltd, November 2007.
- Rescan. 2007d. Schaft Creek 2006 Baseline Reports Socio-Economic and Land Use. Prepared for CopperFox Metals Inc. by Rescan Environmental Services Ltd, March 2007.
- Rescan. 2008a. Schaft Creek 2007 Aquatic Resources Baseline Report. Prepared for CopperFox Metals Inc. by Rescan Environmental Services Ltd.
- Rescan. 2008b. Schaft Creek Ecosystem Mapping Baseline Report. Prepared for CopperFox Metals Inc. by Rescan Environmental Services Ltd.



- Rescan. 2008c. *Schaft Creek Western Toad Baseline 2007*. Prepared for CopperFox Metals Inc. by Rescan Environmental Services Ltd, April 2007.
- Resources Inventory Committee (RIC). 1998. Standard fir Terrestrial Ecosystem Mapping in British Columbia. Province of British Columbia
- Turner, M.H and R. Gannon. 2003. WATERSHEDSS A Decision Support System for Nonpoint Source Pollution Control: Wetlands Information. Project Manager is Judith A. Gale (NCSU). North Carolina State University. Accessed on: January 10, 2008. Accessed from: http://www.water.ncsu.edu/watershedss/info/wetlands/index.html
- Warner, B.G., and C.D.A Rubec (editors). 1997. The Canadian Wetland Classification System: The National Wetlands Working Group. Wetlands Research Centre. University of Waterloo, Waterloo, Ontario



Appendix 1A Summary of 2006 Water Table Elevations

	Schaft Cre	eek-A (SC-A)	Schaft Cre	ek-B (SC-B)	Mess Cree	ek-A (MS-A)	Mess Cree	ek-B (MS-B)
_	Raw Water	Referenced						
Date	Table (cm)	to Survey (m)						
18-06-06	139	2.76	208	2.52	201	4.07	014	2 70
19-06-06	139	2.75	205	2.49	201	4.27	211	3.79
20-06-06	135	2.71	202	2.40	190	4.23	209	3.70
21-06-06	130	2.07	201	2.45	194	4.2	207	3.70
22-00-00	132	2.09	204	2.40	190	4.21	211	3.0
23-00-00	132	2.09	205	2.49	197	4.22	213	3.02
25-06-06	136	2.7	205	2.40	195	4.21	213	3.81
26-06-06	132	2.69	203	2.45	191	4.21	207	3.76
27-06-06	125	2.00	197	2.40	187	4.17	207	3.70
28-06-06	126	2.62	198	2.42	188	4 13	204	3.73
29-06-06	127	2.63	200	2.44	191	4.16	208	3.77
30-06-06	120	2.57	200	2.44	189	4.15	207	3.76
01-07-06	114	2.51	199	2.43	186	4.12	204	3.73
02-07-06	112	2.49	200	2.44	185	4.11	204	3.73
03-07-06	110	2.47	201	2.45	184	4.09	203	3.72
04-07-06	110	2.46	202	2.46	183	4.09	203	3.72
05-07-06	108	2.44	200	2.44	180	4.06	200	3.69
06-07-06	109	2.46	198	2.42	178	4.03	197	3.66
07-07-06	149	2.86	204	2.48	184	4.1	202	3.71
08-07-06	155	2.91	198	2.42	181	4.06	199	3.68
09-07-06	152	2.89	198	2.42	182	4.08	200	3.69
10-07-06	140	2.76	192	2.36	178	4.03	196	3.65
11-07-06	131	2.68	188	2.32	174	3.99	192	3.61
12-07-06	124	2.6	184	2.28	170	3.96	189	3.57
13-07-06	133	2.7	187	2.31	173	3.98	192	3.61
14-07-06	129	2.66	190	2.34	176	4.02	196	3.65
15-07-06	129	2.66	194	2.38	181	4.07	201	3.7
16-07-06	129	2.66	197	2.41	184	4.1	205	3.74
17-07-06	127	2.64	197	2.41	182	4.08	204	3.73
18-07-06	123	2.6	196	2.4	181	4.07	203	3.72
19-07-06	117	2.53	193	2.37	177	4.03	200	3.69
20-07-06	120	2.57	195	2.39	179	4.04	202	3.71
21-07-06	161	2.98	205	2.49	182	4.08	206	3.74
22-07-06	187	3.24	246	2.9	185	4.11	205	3.74
23-07-06	181	3.18	238	2.82	187	4.13	204	3.73
24-07-06	173	3.1	217	2.61	180	4.06	199	3.08
25-07-06	169	3.05	211	2.55	170	4.02	195	3.64
20-07-00	100	3.03	210	2.04	177	4.03	190	3.00
27-07-06	107	3.04	209	2.00	101	4.07	201	3.1
20-07-06	100	2.05	204	2.40	105	4.08	203	3.72
29-07-00	135	2.91	190	2.4	170	4.02	197	3.00
31-07-06	134	2.70	195	2.30	172	3.98	192	3.63
01-08-06	131	2.67	192	2.36	173	3.98	195	3.64
02-08-06	131	2.68	197	2.00	179	4 05	202	3 71
03-08-06	128	2.64	196	24	179	4 05	203	3.72
04-08-06	122	2.58	193	2.37	176	4.02	200	3.69
05-08-06	123	2.59	189	2.33	173	3.99	198	3.67
06-08-06	121	2.58	190	2.34	174	4	199	3.67
07-08-06	120	2.57	186	2.3	170	3.95	195	3.64
08-08-06	137	2.73	186	2.3	171	3.96	195	3.64
09-08-06	130	2.67	192	2.36	176	4.01	201	3.7
10-08-06	127	2.64	193	2.37	176	4.02	202	3.71
11-08-06	121	2.58	190	2.34	174	4	201	3.7
12-08-06	116	2.53	189	2.33	173	3.99	200	3.69
13-08-06	116	2.52	188	2.32	171	3.97	199	3.67
14-08-06	124	2.61	190	2.34	172	3.98	200	3.68
15-08-06	122	2.59	192	2.36	174	3.99	202	3.71
16-08-06	117	2.54	191	2.35	173	3.99	202	3.71
17-08-06	126	2.63	192	2.36	173	3.99	202	3.71
18-08-06	140	2.77	196	2.4	175	4	204	3.73
19-08-06	132	2.69	195	2.39	175	4	205	3.73
20-08-06	123	2.6	192	2.36	1/1	3.97	201	3.7
21-08-06	116	2.53	187	2.31	167	3.93	198	3.66
22-08-06	116	2.53	189	2.33	169	3.95	200	3.69
23-08-06	119	2.56	190	2.34	169	3.95	200	3.69
24-08-06	122	2.59	191	2.35	171	3.90	202	3./1
25-06-06	117	2.54	107	2.31	107	3.92	190	3.07
20-08-06 27-09 06	120	2.00	190	2.34	109	3.94	200	3.09
20 00 00	122	2.09	107	2.31	101	3.31 2 07	197	3.00
20-00-00 20-08-06	137	2.14	10∠ 191	2.20	101	3.01 3.86	191	0.0 3.6
20-00-00	149	2.00 2.00	101	∠.∠0 2.21	101	3.00	191	0.0 2.67
31-00-00	147	∠.04 2.73	107	∠.31 2.21	107	3.33 3.01	190	3.07
01-09-06	168	2.75	180	2.31	168	3.04	102	3.67
02-09-06	165	3.02	200	2.00	168	3 04	108	3.67
03-09-06	158	2.95	192	2.36	169	3.94	199	3.68
04-09-06	151	2.88	190	2.34	169	3.95	200	3,69
05-09-06	155	2.91	202	2.45	178	4.03	208	3.77
06-09-06	149	2.86	198	2.42	177	4.02	208	3.77
07-09-06	142	2.79	189	2.33	169	3.94	199	3,68
08-09-06	134	2.7	180	2.24	161	3.87	191	3.6
09-09-06	131	2.67	182	2.26	162	3.88	193	3.62



	Summary of	of 2007 Water T	able Elevatio	ns
	Schaft Cre	ek-A (SC-A)	Mess Cre	ek-A (MS-A)
Data	Raw Water	Referenced	Raw Water	Referenced
24.06.07	Table (cm)	5 06		
25-06-07	46	5.00	78	3.5
26-06-07	40	4.95	77	3.49
27-06-07	53	5.08	77	3.49
28-06-07	67	5.22	78	3.5
29-06-07	74	5.29	80	3.52
30-06-07	75	5.3	87	3.59
01-07-07	67	5.22	95	3.67
02-07-07	55	5.1	93	3.65
03-07-07	50	5.05	00 87	3.0
05-07-07	67	5.22	93	3.65
06-07-07	54	5.09	90	3.62
07-07-07	46	5.01	84	3.56
08-07-07	46	5.01	82	3.54
09-07-07	53	5.08	81	3.53
10-07-07	85	5.4	88	3.6
11-07-07	94	5.49	119	3.91
12-07-07	90	5.45	122	3.94
13-07-07	100	5.00	127	3.99
14-07-07	94	5 47	120	3.92
16-07-07	89	5.44	111	3.83
17-07-07	86	5.41	107	3.79
18-07-07	88	5.43	96	3.67
19-07-07	89	5.44	92	3.64
20-07-07	90	5.45	91	3.63
21-07-07	87	5.42	88	3.6
22-07-07	82	5.37	82	3.54
23-07-07	78	5.33	80	3.52
25-07-07	68	5 23	78	3.49
26-07-07	62	5.17	76	3.48
27-07-07	57	5.12	76	3.48
28-07-07	59	5.14	75	3.47
29-07-07	55	5.1	75	3.47
30-07-07	54	5.09	75	3.47
31-07-07	49	5.04	74	3.46
01-08-07	41	4.96	73	3.45
02-08-07	32	4.9	72	3.44
04-08-07	29	4.84	70	3.42
05-08-07	28	4.83	69	3.41
06-08-07	26	4.81	70	3.42
07-08-07	33	4.88	68	3.4
08-08-07	56	5.11	68	3.4
09-08-07	57	5.12	67	3.39
10-08-07	86	5.41	67	3.39
12-08-07	66	5.32	66	3.39
13-08-07	53	5.08	66	3.38
14-08-07	46	5.01	66	3.38
15-08-07	40	4.95	65	3.37
16-08-07	37	4.92	65	3.37
17-08-07	57	5.12	65	3.37
18-08-07	73	5.28	65	3.37
19-08-07	72	5.27	65	3.37
20-08-07	51	5.10	63	3.30
22-08-07	46	5.00	62	3.34
23-08-07	44	4.99	63	3.35
24-08-07	43	4.98	62	3.34
25-08-07	83	5.38	63	3.35
26-08-07	85	5.4	62	3.34
27-08-07	74	5.29	61	3.33
28-08-07	65	5.19	62	3.34
29-08-07	13	5.∠ŏ 5.23	03 61	3.34
31-08-07	60 60	5.25 5.15	63	3.35
01-09-07	52	5.07	63	3.35
02-09-07	51	5.06	62	3.34
03-09-07	67	5.22	62	3.34
04-09-07	67	5.22	61	3.33
05-09-07	62	5.17	62	3.34
06-09-07	51	5.06	61	3.33

Appendix 1B Summary of 2007 Water Table Elevations

Арр	pendix 1B	
Summary of 2007 Water	Table Elevations	(completed)

	Schaft Cre	ek-A (SC-A)	Mess Creek-A (MS-A)			
-	Raw Water	Referenced	Raw Water	Referenced		
Date	Table (cm)	to Survey (m)	Table (cm)	to Survey (m)		
07-09-07	43	4.98	60	3.32		
08-09-07	41	4.96	59	3.31		
09-09-07	40	4.95	61	3.32		
10-09-07	39	4.93	59	3.31		
11-09-07	39	4.94	58	3.3		
12-09-07	39	4.94	58	3.3		
13-09-07	39	4.94	58	3.3		
14-09-07	39	4.94	58	3.3		
15-09-07	50	5.04	59	3.31		
16-09-07	50	5.11	58	3.3		
17-09-07	40	1.02	56	3.3		
10-09-07	33	4.33	57	3.20		
20-09-07	44	4.93	58	3.3		
21-09-07	85	5.4	61	3 33		
22-09-07	78	5.33	60	3.32		
23-09-07	64	5.18	59	3.31		
24-09-07	66	5.21	61	3.33		
25-09-07	58	5.13	62	3.34		
26-09-07	50	5.05	61	3.33		
27-09-07	56	5.11	60	3.32		
28-09-07	65	5.2	61	3.33		
29-09-07	61	5.16	61	3.33		
30-09-07	61	5.16	61	3.33		
01-10-07	57	5.12	62	3.34		
02-10-07	57	5.12	63	3.35		
03-10-07	45	5	61	3.33		
04-10-07	40	4.95	60	3.32		
05-10-07	45	5	61	3.33		
06-10-07	60 55	5.15	61	3.33		
07-10-07	55	5.I	62	3.34		
08-10-07	53	5.06	61	3.32		
10-10-07	73	5.28	62	3.32		
11-10-07	77	5.32	62	3 34		
12-10-07	61	5.16	61	3 33		
13-10-07	83	5.38	65	3.37		
14-10-07	90	5.45	66	3.38		
15-10-07	89	5.44	67	3.39		
16-10-07	81	5.36	66	3.38		
17-10-07	70	5.25	65	3.37		
18-10-07	64	5.19	65	3.37		
19-10-07	45	5	63	3.35		
20-10-07	28	4.83	62	3.34		
21-10-07	28	4.83	63	3.35		
22-10-07	56	5.11	64	3.36		
23-10-07	51	5.06	63	3.35		
24-10-07	48	5.03	60	3.37		
25-10-07	42	4.97	62	3.34		
27-10-07	80	5.00	65	3.33		
28-10-07	84	5.39	65	3.37		
29-10-07	71	5.26	65	3 37		
30-10-07	71	5.26	67	3.39		
31-10-07	92	5.47	68	3.4		
01-11-07	85	5.4	68	3.4		
02-11-07	77	5.32	68	3.4		
03-11-07	62	5.16	66	3.38		
04-11-07	35	4.9	63	3.35		
05-11-07	27	4.82	65	3.37		
06-11-07	26	4.8	64	3.36		
07-11-07	24	4.79	64	3.36		
08-11-07	22	4.77	62	3.34		
09-11-07	25	4.8	64	3.36		
10-11-07	28	4.83	66	3.38		
11-11-07	26	4.8	64	3.36		
12-11-07	29	4.83	65	3.37		
10-11-07	23 26	4./0	04 64	3.30 3.36		
15-11-07	32	4.87	65	3.37		
16-11-07	31	4.86		0.01		



Appendix 2 Wetland Vegetation Species List

	pecies Plot	Genus	Species	Plot	Genus	Species	Plot	Genus	Species
SW1 Platanthra dil	ilatata SW8	Sanguisorba	officinalis	SW13	Vaccinium	membranaceum	SW18	Gaultheria	hispidula
SW1 Betula n	nana SW8	Čarex	macrochaeta	SW13	Salix	commutata	SW18	Eriophorum	, angustifolium
SW1 Meananthius trif	foliata SW8	Vaccinium	caespitosum	SW13	Abies	lasiocarpa	SW18	Carex	aquatilis
SW1 Sanguisorba offi	icinalis SW8	Equisetum	arvense	SW13	Pinus	contorta	SW18	Platanthra	dilatata
SW1 Carex alb	oniara SW8	Salix	sn	SW14	Pinus	contorta	SW18	Trichophorum	cespitosum
SW1 Trichophorum cesr	nitosum SW9	Vaccinium	membranaceum	SW14	Abies	lasiocarna	SW18	Sanquisorba	officinalis
SW1 Viola	son SW9	Empetrum	niarum	SW14	Betula	nana	SW18	Tofieldia	alutinosa
SW1 Rubus	sp SW9	Pinus	contorta	SW14	Potentilla	fruticosa	SW19	Picea	sn
SW1 Fauisetum an	Verse SW9	Ahies	lasiocarna	SW14	Rubus	arcticus	SW/19	Ledum	aroenlandicum
SW1 Epilobium and	stifolium SW0	Valoriana	sitchonsis	SW14			SW/10	Botula	nana
SW2 Equisetum angus	Nonso SW9	Sphagnum	311011011313	SW14	Empotrum	niarum	SW19	Saliy	son
SW2 Equiserba offi		Corox	sp	SW14	Coulthorio	humifuno	SW19 SW10	Botontillo	frutionno
SW2 Sariguisonda Onio	suctilia SW10	Datula	aquauns	SW14	Gauilliena	officinalia	SW19	Folentina	nuicosa
SW2 Calex aqu	uatifalium SW10	Deluia	lialia	SVV 14	Sanguisorba	Onicinalis	SW19	Emperum	nigrum
SW2 Epilobium angus	ISUIOIIUIII SVV10	Sanguisorba	onicinaiis	50014	Cornus	canadensis	50019	Rubus	arclicus
SW2 Salix drumn	mondiana Svv10	Rubus	arcticus	50014	i nentalis	arctica	50019	Equisetum	arvense
SW2 Mneum S	spp SW10	I ricnopriorum	cespitosum	50014	Eriophorum	angustiroilum	SW19	Sanguisorba	omcinalis
SW3 Carex aqu	uatilis Svv10	Platanthra	allatata	50014	Carex	aquatilis	50019	Carex	aquatilis
SW3 Betula n	nana SW10	Spnagnum	sp	SW14	I ricnopnorum	cespitosum	SW19	Trientalis	arctica
SW3 Salix ba	arclayı SW10	Salix	sp	SW14	Carex	disperma	SW20	Potentilla	truticosa
SW3 Potentilla pal	alustris SW11	Carex	aquatilis	SW15	Picea	sp	SW20	Ledum	groenlandicum
SW3 Equisetum arv	vense SW11	Meananthius	trifoliata	SW15	Betula	nana	SW20	Betula	nana
SW4 Carex aqu	guatilis SW11	Trichophorum	cespitosum	SW15	Potentilla	fruticosa	SW20	Carex	aquatilis
SW4 Betula n	nana SW11	Betula	nana	SW15	Salix	sp	SW20	Trichophorum	cespitosum
SW4 Rubus :	sp SW11	Pinus	contorta	SW15	Rubus	arcticus	SW20	Eriophorum	angustifolium
SW4 Sanguisorba offic	icinalis SW11	Ledum	groenlandicum	SW15	Gaultheria	humifusa	SW20	Carex	pauciflora
SW4 Salix :	sp SW11	Kalmia	microphylla	SW15	Ledum	groenlandicum	SW21	Picea	sp
SW4 Fragaria	sp SW11	Phyllodoce	glanduliflora	SW15	Carex	aquatilis	SW21	Betula	nana
SW4 Equisetum an	vense SW11	Nuphar	polysepalum	SW15	Equisetum	hyemale	SW21	Ledum	groenlandicum
SW5 Salix	sp SW11	Carex	macrochaeta	SW15	Trichophorum	cespitosum	SW21	Potentilla	fruticosa
SW5 Betula n	nana SW11	Sanguisorba	officinalis	SW15	Viola	spp	SW21	Rubus	arcticus
SW5 Sanguisorba offic	icinalis SW11	Equisetum	arvense	SW15	Pyrola	asarifolia	SW21	Gaultheria	humifusa
SW5 Carex aq	guatilis SW11	Trientalis	arctica	SW15	Platanthra	dilatata	SW21	Oxycoccus	oxycoccos
SW5 Rubus arc	rcticus SW11	Rubus	arcticus	SW15	Anemone	parviflora	SW21	Empetrum	nigrum
SW5 Equisetum an	vense SW11	Leptarrhena	pvrolifolia	SW16	Picea	, sp	SW21	Carex	aquatilis
SW5 Sphagnum	SDD SW11	Salix	SD	SW16	Betula	nana	SW21	Platanthra	dilatata
SW5 Ledum aroen	andicum SW11	Platanthra	dilatata	SW16	Salix	SD	SW21	Equisetum	arvense
SW5 Picea	sp SW11	Oxycoccus	OXVCOCCOS	SW16	Oxycoccus	oxycoccos	SW21	Sanguisorba	officinalis
SW6 Carex ag	auatilis SW11	Vaccinium	caespitosum	SW16	Ledum	aroenlandicum	SW21	Trichophorum	cespitosum
SW6 Betula n	nana SW12	Salix	barclavi	SW16	Carex	aquatilis	SW21	Fauisetum	hvemale
SW6 Sanguisorba offi	icinalis SW12	Betula	nana	SW16	Fauisetum	arvense	SW21	Cornus	canadensis
SW6 Enilobium angu	istifolium SW12	Salix	commutata	SW16	Viola	son	SW21	Friophorum	angustifolium
SW6 Carex lir	mosa SW12	Carex	aquatilis	SW16	Sphagnum	spp	SW21	Sphagnum	snn
SW6 Rubus arr	rcticus SW12	Fauisetum	arvense	SW16	Mneum	spp	SW22	Pinus	contorta
SW6 Sphagnum	spp SW12	Rubus	arcticus	SW/17	Picea	sp	SW22	Potentilla	fruticosa
SW6 Viola	spp 5W12	Ledum	aroonlandicum	SW/17	Alnus	sp	SW22	Botula	nana
SWG Plotonthro dii	ilototo SW12	Sanguigarha	officinalia	SW17	Soliv	sp	SW22	Bubuo	orotiouo
SW6 Triontolio		Dinun	ontorto	SW17	Lodum	aroonlandiaum	SW22	Ownoocoup	arcticus
SW0 Ineritalis Iau		Fillus	triongularia	SW17	Detulo	gioenianuicum	SW22	Caultharia	burnifuno
SW7 Carex aqu	Juaniis Swiis	Distonthro	dilatata	SVV17	Deluia	nana	5W22	Gauitriena	numiusa
SW7 Detuia II		Plataritrita	ullalala	50017	Rubus	arclicus	5VV22	Emperium	nigruni
SW7 Sanguisorba omo	icinalis Svv13	Sanguisorba	omcinalis	50017	Oxycoccus	oxycoccos	SVVZZ	Salix	sp
SW7 Epilobium angus	Istifolium SW13	Equisetum	arvense	SW17	Empetrum	nigrum	SW22	Carex	aquatilis
SW7 Carex IIn	mosa SW13	Leaum	groeniandicum	SW17	Potentilla	truticosa	SW22	I ricnopnorum	cespitosum
SW7 Rubus ard	cticus SW13	Leptarrhena	pyrolitolia	SW17	Sanguisorba	officinalis	SW22	Cornus	canadensis
SW7 Sphagnum s	spp SW13	Carex	sp	SW17	Equisetum	arvense	SW23	Picea	sp
SW7 Viola s	spp SW13	Disporum	hookeri	SW17	Carex	aquatilis	SW23	Betula	nana
SW7 Platanthra dil	llatata SW13	Kalmia	microphylla	SW17	Cornus	canadensis	SW23	Potentilla	fruticosa
SW7 Trientalis lat	tifolia SW13	Rubus	chamaemorus	SW17	Gaultheria	humifusa	SW23	Rubus	arcticus
SW8 Betula n	nana SW13	Salix	barclayi	SW17	Sphagnum	spp	SW23	Carex	aquatilis
SW8 Pinus cor	ontorta SW13	Sorbus	sitchensis	SW18	Pinus	contorta	SW23	Trichophorum	cespitosum
SW8 Abies lasie	iocarpa SW13	Sphagnum	sp	SW18	Picea	sp	SW23	Carex	utriculata
SW8 Kalmia micr	rophylla SW13	Phyllodoce	glanduliflora	SW18	Potentilla	fruticosa	SW24	Pinus	contorta
SW8 Empetrum nig	igrum SW13	Lycopodium	annotinum	SW18	Betula	nana	SW24	Potentilla	fruticosa
SW8 Polytrichum	sp SW13	Anemone	parviflora	SW18	Ledum	groenlandicum	SW24	Ledum	groenlandicum

(continued)

Appendix 2
Wetland Vegetation Species List (continued)

Plot	Genus	Species	Plot	Genus	Species	Plot	Genus	Species	Plot	Genus	Species
SW24	Betula	nana	SW29	Pinus	contorta	SW33	Meananthius	trifoliata	SW39	Ledum	groenlandicum
SW24	Oxycoccus	oxycoccos	SW29	Ledum	groenlandicum	SW34	Picea	sp	SW39	Empetrum	nigrum
SW24	Empetrum	niarum	SW29	Empetrum	niarum	SW34	Salix	barclavi	SW39	Carex	aquatilis
SW24	Carex	aquatilis	SW29	Oxycoccus	oxvcoccos	SW34	Rubus	arcticus	SW39	Trichophorum	alpinum
SW24	Meananthius	trifoliata	SW29	Gaultheria	humifusa	SW34	Salix	commutata	SW39	Platanthra	dilatata
SW24	Trichophorum	cespitosum	SW29	Rubus	chamaemorus	SW34	Pinus	contorta	SW39	Sanquisorba	officinalis
SW24	Friophorum	angustifolium	SW29	Rubus	arcticus	SW34	Platanthra	dilatata	SW39	Frionhorum	angustifolium
SW24	Sphagnum	sn	SW/29	Saliv	snn	SW/34	Fauisetum	anvense	SW/40	Nunhar	nolvsenalum
SW24	Botontillo	frutionno	SW29	Caroy	spp	SW34	Corox	diopormo	SW40	Dioco	polysepalulli
SW25	Poteriulia	nuicosa	SW29	Distanthro	dilatata	SW34	Calex	uisperma	SW41	Dinun	sp
SVV25	Deluia	nana	SVV29	Platantina	ullalala	50034	Juncus	arcucus	50041	Pinus	Contona
50025	Gauithena	numitusa	SW29	Equisetum	arvense	50034	Seriecio	triangularis	50041	Potentilla	truticosa
SW25	Salix	sp	SW29	Eriopnorum	angustitolium	SW34	Luzuia	parvitiora	SW41	Oxycoccus	oxycoccos
SW25	Ledum	groenlandicum	SW29	Angelica	arguta	SW34	Calamagrostis	canadensis	SW41	Ledum	groenlandicum
SW25	Empetrum	nigrum	SW29	Galium	triflorum	SW34	Carex	aquatilis	SW41	Empetrum	nigrum
SW25	Rubus	arcticus	SW29	Viola	sp	SW35	Salix	barclayi	SW41	Rubus	arcticus
SW25	Anemone	parviflora	SW29	Sphagnum	spp	SW35	Rubus	arcticus	SW41	Eriophorum	angustifolium
SW25	Viola	sp	SW30	Picea	sp	SW35	Equisetum	arvense	SW41	Platanthra	dilatata
SW25	Carex	aquatilis	SW30	Pinus	contorta	SW35	Carex	lasiocarpa	SW41	Trichophorum	cespitosum
SW25	Platanthra	dilatata	SW30	Ledum	groenlandicum	SW35	Sphagnum	sp	SW41	Carex	aquatilis
SW25	Equisetum	hyemale	SW30	Empetrum	nigrum	SW36	Pinus	contorta	SW41	Drosera	rotundifolia
SW25	Pyrola	asarifolia	SW30	Oxycoccus	oxycoccos	SW36	Potentilla	fruticosa	SW41	Equisetum	arvense
SW25	Tofieldia	alutinosa	SW30	Gaultheria	humifusa	SW36	Ledum	aroenlandicum	SW41	, Carex	stvlosa
SW25	Carex	pluriflora	SW30	Rubus	chamaemorus	SW36	Betula	nana	SW42	Alnus	sp
SW25	Trialochin	maritimum	SW30	Rubus	arcticus	SW36	Rubus	arcticus	SW42	Salix	barclavi
SW25	Pinquicula	vulgaris	SW30	Salix	son	SW36	Oxycoccus	OXVCOCCOS	SW42	Oxycoccus	OXVCOCCOS
SW25	Meananthius	trifoliata	SW30	Carex	aquatilis	SW36	Picea	sn	SW42	Ledum	aroenlandicum
SW25	Frionhorum	angustifolium	SW/30	Platanthra	dilatata	SW/36	Trichonhorum	əlninum	SW42	Rubus	arcticus
SW26	Botula	nana	SW/30	Fauisotum	20/0050	SW/36	Friophorum	angustifolium	SW/42	Salix	en
SW20	Detund	frutionan	SW30	Equiselum	di verise	SW30	Enopriorum	angustiiolium	SW42	Datula	sp
SVV20	Polenina	nuucosa	50030	Enopriorum	angusuioiium	50030	Disasin	unonala 	5VV42	Detuia	nana
50026		cespitosum	50030	Angelica	arguta	50036	Drosera	rotunditolla	50042	Potentilla	palustris
SW26	i ofieldia	giutinosa	SW30	Gallum	trifiorum	SW36	Sanguisorba	officinalis	SW42	Carex	aquatilis
SW26	Carex	aquatilis	SW30	Viola	sp	SW36	Carex	aquatilis	SW42	Meananthius	tritoliata
SW26	Pinguicula	vulgaris	SW30	Sphagnum	spp	SW36	Carex	limosa	SW42	Carex	kelloggii
SW27	Pinus	contorta	SW31	Picea	sp	SW37	Pinus	contorta	SW42	Viola	sp
SW27	Picea	sp	SW31	Salix	barclayi	SW37	Betula	nana	SW42	Sphagnum	sp
SW27	Potentilla	fruticosa	SW31	Rubus	arcticus	SW37	Potentilla	fruticosa	SW42	Mneum	sp
SW27	Betula	nana	SW31	Salix	commutata	SW37	Ledum	groenlandicum	SW43	Picea	sp
SW27	Empetrum	nigrum	SW31	Betula	nana	SW37	Oxycoccus	oxycoccos	SW43	Betula	nana
SW27	Gaultheria	humifusa	SW31	Pinus	contorta	SW37	Picea	sp	SW43	Potentilla	fruticosa
SW27	Rosa	sp	SW31	Carex	aquatilis	SW37	Carex	lasiocarpa	SW43	Rubus	arcticus
SW27	Ledum	groenlandicum	SW31	Equisetum	arvense	SW37	Trichophorum	alpinum	SW43	Ledum	groenlandicum
SW27	Carex	aquatilis	SW31	Viola	sp	SW37	Platanthra	dilatata	SW43	Empetrum	niarum
SW27	Trichophorum	cespitosum	SW31	Platanthra	dilatata	SW37	Drosera	rotundifolia	SW43	Oxycoccus	oxycoccos
SW27	Pyrola	asarifolia	SW31	Snhagnum	sn	SW37	Meananthius	trifoliata	SW43	Salix	sn
SW27	Meananthius	trifoliata	SW32	Salix	harclavi	SW37	Carex	limosa	SW43	Meananthius	trifoliata
SW27	Δηρησηρ	narviflora	SW/32	Betula	nana	SW/37	Sphagnum	50	SW/43	Carey	limosa
SW/28	Picea	parvinora	SW/32	Dicoa	en	SW/38	Potentilla	fruticosa	SW/43	Platanthra	dilatata
SW20	Dipup	sp	SW32	Pubuo	orotious	SW30	Potulo	nano	SW43	Fauiootum	aniana
SW20	Fillus	contonta	SW32	Colomographia	arcticus	50030	Deluia	haralavi	SW43	Equiselum	di verise
57728	Leaum	groeniandicum	50032	Calamagrostis	canadensis	50038	Salix	barciayi	50043	Eriophorum	angustitolium
57728	Empetrum	nigrum	50032	Equisetum	arvense	50038	Pinus	соптопа	50043	Parnassia	timbriata
SW28	Oxycoccus	oxycoccos	SW32	Irientalis	arctica	SW38	Salix	commutata	SW43	Viola	sp
SW28	Gaultheria	hispidula	SW32	Viola	sp	SW38	Picea	sp	SW43	Pinus	contorta
SW28	Gaultheria	humifusa	SW32	Sphagnum	sp	SW38	Carex	aquatilis	SW43	Alnus	sp
SW28	Rubus	chamaemorus	SW33	Picea	sp	SW38	Eriophorum	angustifolium	SW43	Salix	commutata
SW28	Rubus	arcticus	SW33	Betula	nana	SW38	Trichophorum	alpinum	SW43	Trientalis	arctica
SW28	Betula	nana	SW33	Rubus	arcticus	SW38	Viola	spp	SW43	Antennaria	pulcherrima
SW28	Potentilla	fruticosa	SW33	Ledum	groenlandicum	SW38	Platanthra	dilatata	SW44	Picea	sp
SW28	Carex	aquatilis	SW33	Salix	barclayi	SW39	Pinus	contorta	SW44	Betula	nana
SW28	Equisetum	hyemale	SW33	Carex	aquatilis	SW39	Picea	sp	SW44	Potentilla	fruticosa
SW28	Trichophorum	cespitosum	SW33	Carex	limosa	SW39	Potentilla	fruticosa	SW44	Rosa	SD
SW28	Cornus	canadensis	SW33	Trichophorum	cespitosum	SW39	Rubus	arcticus	SW44	Rubus	arcticus
SW28	Sphagnum	sp	SW33	Eriophorum	angustifolium	SW39	Betula	nana	SW44	Ledum	aroenlandicum
SW29	Picea	sn	SW33	Fauisetum	arvense	SW39	Oxycoccus	OXVCOCCOS	SW44	Oxycoccus	OXVCOCCOS
01120	1 1000	υμ	01100	Equiootan	01100100	51100	01,000000	37,7000000	01111	07,0000003	57,000000

(continued)

Appendix 2	
Wetland Vegetation Species List (continued)	

Plot	Gonue	Species	Plot	Gonue	Species	Plot	Gonue	Species	D	lot	Gonue	Species
FIOL	Genus	opecies	FIUL	Genus	opecies		Genus	opecies	<u></u>		Genus	opecies
SVV44	Eriopnorum	angustitolium	SVV49	Carex	limosa	SW56	Carex	aquatilis	S	VV60	Eriopnorum	angustitolium
SW44	Salix	sp	SW49	Sanguisorba	officinalis	SW56	Trichophorum	cespitosum	S	W60	Equisetum	arvense
SW44	Gaultheria	humifusa	SW49	Arctostaphylos	uva-ursi	SW56	Platanthra	dilatata	S	W60	Platanthra	dilatata
SW44	Carex	aquatilis	SW/49	Snhagnum	sn	SW56	Sanquisorha	officinalis	S	W60	Snhagnum	sn
SWAA	Trichonhorum	aquatino	SWE0	Moononthiuo	trifolioto	SINES	Moononthiun	trifolioto	0	WEO	Nunbor	nolvoonolum
30044		cespilosum	3000	weananunus	liilliala	30000		unonala	3	1000	Nupriar	polysepalum
SW44	Platanthra	dilatata	SW50	Nuphar	polysepalum	SW56	Trientalis	arctica	S	VV61	Pinus	contorta
SW44	Viola	sp	SW51	Picea	sp	SW56	Potentilla	palustris	S	W61	Picea	sp
SW44	Sphaqnum	sp	SW51	Betula	nana	SW57	Juniperus	communis	S	W61	Betula	nana
SW45	Salix	, barclavi	SW51	Potentilla	fruticosa	SW57	Pinus	contorta	S	W61	Empetrum	niarum
SW/4E	Potulo	nono	SWE1	Pubuo	orotiouo	S/ME7	Empotrum	niarum	0	W/61	Dubuo	orotiouo
30045	Deluia	lidiid	3001	Rubus	arcticus	30037	Emperum	nigrunn	3	1001	Rubus	arcticus
SW45	Oxycoccus	oxycoccos	SW51	Salix	spp	SW57	Arctostaphylos	uva-ursi	S	VV61	Sanguisorba	officinalis
SW45	Platanthra	dilatata	SW51	Carex	aquatilis	SW57	Ledum	groenlandicum	S	W61	Trichophorum	cespitosum
SW45	Carex	aquatilis	SW51	Sanguisorba	officinalis	SW57	Oxvcoccus	oxvcoccos	S	W61	Leptarrhena	pvrolifolia
SW45	Fauisetum	arvense	SW51	Viola	sn	SW57	, Betula	nana	S	W61	, Fauisetum	arvense
SWAE	Durolo	anvorifolio	SW61	Pornocoio	fimbrioto	C\N/57	Bubuo	orotiouo	0	WG1	Equiootum	onguntifolium
30045	Fyillia	asaniona	3001	Failidssid	IIIIDIIdid	30037	Rubus	arcticus	3	1000	Epilobium	angustiiollum
SVV45	Potentilla	paiustris	SW52	Picea	sp	SW57	Sanguisorba	officinalis	5	VV61	Carex	sp
SW45	Sphagnum	sp	SW52	Pinus	contorta	SW57	Eriophorum	angustifolium	S	W61	Platanthra	dilatata
SW45	Mneum	sp	SW52	Betula	nana	SW57	Carex	aquatilis	S	W61	Viola	sp
SW46	Picea	sn	SW52	Potentilla	fruticosa	SW57	Platanthra	dilatata	S	W61	Sphagnum	sn
SW/46	Botula	nana	SW/52	Lodum	aroonlandicum	S\M57	Trichophorum	cospitosum	6	W61	Meananthius	trifoliata
30040	Delula	nana	3002	Leuum	gioenianuicum	00057	Inchopholum	cespilosum	3		weananunus	linonala
SW46	Rubus	arcticus	SW52	Carex	aquatilis	SW57	Meananthius	trifoliata	S	VV61	Nuphar	polysepalum
SW46	Carex	utriculata	SW52	Platanthra	dilatata	SW57	Equisetum	arvense	S	W62	Picea	sp
SW46	Potentilla	palustris	SW52	Antennaria	pulcherrima	SW57	Carex	limosa	S	W62	Salix	barclayi
SW/46	Carex	aquatilis	SW52	Trichonhorum	cesnitosum	SW57	Trientalis	arctica	S	W62	Salix	commutata
CW/46	Viala	aquatino	6W/52	Songuioorbo	officinalia	CINE7	Fauiootum	fluniatila	0	WED	Ouria	ovivoooooo
30040	VIOIA	sp	30052	Sanguisorba	onicinalis	30057	Equiseium	nuviaule	3	VV62	Oxycoccus	OXYCOCCOS
SW46	Mneum	sp	SW52	Eriophorum	angustifolium	SW57	Carex	lanuginosa	S	W62	Betula	nana
SW47	Picea	sp	SW53	Salix	barclayi	SW58	Pinus	contorta	S	W62	Ledum	groenlandicum
SW47	Pinus	contorta	SW53	Carex	limosa	SW58	Picea	sp	S	W62	Rubus	arcticus
SW/47	Botula	nana	SW/53	Meananthius	trifoliata	S\W/58	Retula	nana	5	W62	Pinus	contorta
CW47	Detentille	frutionan	0W50	Detentille	noluotrio	CINEO	Dotontillo	frutiona	0	WED	Colin	contonta
50047	Potentina	nuucosa	30033	Poteritina	palustris	30050	Potentilla	nuucosa	3	VV62	Salix	sp
SW47	Ledum	groenlandicum	SW53	Sphagnum	sp	SW58	Rubus	arcticus	S	W62	Equisetum	arvense
SW47	Gaultheria	humifusa	SW54	Picea	sp	SW58	Ledum	groenlandicum	S	W62	Carex	aquatilis
SW47	Oxvcoccus	oxvcoccos	SW54	Betula	nana	SW58	Gaultheria	humifusa	S	W62	Sanquisorba	officinalis
SW/47	Carev	aquatilis	SW54	Salix	harclavi	S\W58	Kalmia	micronhylla	S	W62	l entarrhena	nvrolifolia
01147	Triskankan	uquutins	011/54	Distantions	diciayi	011/50	C-lin	microphyna	0	WC2	Triantalia	pyrolliolla
50047	Tricnophorum	cespitosum	57754	Platanthra	allatata	50058	Salix	sp	5	VV62	Thentalis	arctica
SW47	Tofieldia	glutinosa	SW54	Rubus	arcticus	SW58	Carex	limosa	S	W62	Eriophorum	angustifolium
SW47	Antennaria	pulcherrima	SW54	Carex	aquatilis	SW58	Meananthius	trifoliata	S	W62	Platanthra	dilatata
SW47	Eriophorum	angustifolium	SW54	Carex	disperma	SW58	Trichophorum	cespitosum	S	W62	Epilobium	angustifolium
SW/47	Carey	limosa	SW/54	Carev	50	S\W/58	Platanthra	dilatata	5	W62	Valeriana	sitchonsis
01/47		1111030	01/04		sp ii-	011/50	Triantalia	unatata	3	WC2	Valeriaria	311011011313
50047	Potamogeton	natans	50054	Calamagrostis	canadensis	50058	Inentalis	arctica	5	VV62	Spnagnum	sp
SW48	Picea	sp	SW54	Epilobium	angustifolium	SW58	Sanguisorba	officinalis	S	W63	Salix	barclayı
SW48	Betula	nana	SW54	Sphagnum	sp	SW58	Carex	lanuginosa	S	W63	Salix	sp
SW48	Rubus	arcticus	SW55	Salix	barclavi	SW59	Salix	commutata	S	W63	Picea	SD
SW/48	Ovucoccus	02000000	SW/55	Rubus	arcticus	\$\\//59	Picea	sn	S	W63	Saliv	commutata
01140	Onycoccus	by coccos	01155	Caller		01150	Diaura	3p	0	W00	l a sta sub a sa a	commutata
30040	Gauitrieria	numiusa	30055	Salix	commutata	30059	Pinus	contonta	3	0003	Leplannena	pyrolliolla
SW48	Salix	sp	SW55	Pinus	contorta	SW59	Betula	nana	S	W63	Carex	aquatilis
SW48	Carex	limosa	SW55	Carex	aquatilis	SW59	Potentilla	fruticosa	S	W63	Sanguisorba	officinalis
SW48	Meananthius	trifoliata	SW55	Equisetum	arvense	SW59	Ledum	aroenlandicum	S	W63	Rubus	arcticus
SW/48	Trichonhorum	cospitosum	SW65	Epilobium	angustifolium	\$\\/50	Caulthoria	humifusa	9	Wes	Equisotum	20/0050
01/40		cespilosum	0005	Epilobium	angusuioiium	00059	Gaululella	nunnusa	0	W03		
SVV48	Eriopnorum	angustitolium	SW55	Platanthra	dilatata	SW59	Platanthra	dilatata	5	VV63	Epilobium	angustitolium
SW48	Mneum	sp	SW55	Pyrola	asarifolia	SW59	Trichophorum	cespitosum	S	W63	Platanthra	dilatata
SW49	Picea	sp	SW55	Sphagnum	sp	SW59	Triglochin	maritimum	S	W64	Salix	barclayi
SW/49	Pinus	contorta	SW55	Mneum	sn	SW59	Antennaria	nulcherrima	S	W64	Rubus	arcticus
SW/40	Potulo	nono	SWEE	Potulo	nono	C11/60	Coroy	oquotilio	0	WEA	Equipotum	01/01/040
30049	Delula	lidiid	3000	Beluia	lidila	30039	Galex	aquauns	3	VV04	Equiseium	aivense
SW49	Potentilla	truticosa	SW56	Rubus	arcticus	SW59	Anemone	parviflora	S	vv64	Carex	aquatilis
SW49	Ledum	groenlandicum	SW56	Arctostaphylos	uva-ursi	SW60	Picea	sp	S	W64	Sanguisorba	officinalis
SW49	Oxvcoccus	oxvcoccos	SW56	Oxycoccus	oxvcoccos	SW60	Betula	nana	S	W64	Platanthra	dilatata
SW/49	Empetrum	niarum	SW/56	Ledum	aroenlandicum	SW/60	Salix	harclavi	0	W64	Lontarrhona	nyrolifolia
CW43	Dubus	ngrum	0000	Ecouin Emp-traine	giociliariuculti	611/00	Durburg	oroti	0	WC 4	Denursului	pyrolliolla
50049	Rubus	arcticus	50050	Empetrum	nigrum	5000	Rubus	arcticus	S	vv64	Ranunculus	sp
SW49	Carex	aquatilis	SW56	Pinus	contorta	SW60	Salix	commutata	S	vv64	Equisetum	fluviatile
SW49	Meananthius	trifoliata	SW56	Picea	sp	SW60	Pinus	contorta	S	W64	Mneum	sp
SW49	Trichophorum	cespitosum	SW56	Carex	limosa	SW60	Leptarrhena	pyrolifolia	S	W65	Picea	sp
SW/49	Drosera	rotundifolia	SW56	Frionhorum	angustifolium	SW60	Carex	aquatilis	9	W65	Betula	nana
311-13	0100010	i otari unona	51100	Linophorum	anguotiioiiuiii	31100	Guica	uquuliio	3		Dotala	nana

Appendix 2	
Wetland Vegetation Species List (completed)	

Perto Genus Special First Genus Special First Genus Special SVM0 Anna ap SVM1 Fraze ap ap SVM1 Fraze ap SVM1 Fraze ap SVM1 Fraze ap SVM1 Fraze ap SVM1 S					Wetland	Vegetation e	pco		compicted)		_			
SW16 Aluse 40 SW17 Pices 40 SW17 Exclusionant SW15 Careex aquation SW16 Sumpached SW17 Trickphorum complexionant SW15 Trickphorum complexionant SW15 Trickphorum complexionant SW17 Trickphorum SW17	Plot	Genus	Species	Plot	Genus	Species		Plot	Genus	Species	P	lot	Genus	Species
SNMS Standard spin SVV7 Sangulatoria SVV7 Tracinghourn SVMS Pringuitation SVMS Pringuitation SVMS Pringuitation <td>SW65</td> <td>Alnus</td> <td>sp</td> <td>SW71</td> <td>Picea</td> <td>sp</td> <td></td> <td>SW79</td> <td>Eriophorum</td> <td>angustifolium</td> <td>S</td> <td>W85</td> <td>Carex</td> <td>aquatilis</td>	SW65	Alnus	sp	SW71	Picea	sp		SW79	Eriophorum	angustifolium	S	W85	Carex	aquatilis
Styles Meanurbule entities Style Trichsphourn Contrain Direction Direction Styles Planathin Styles Notes Styles	SW65	Salix	spp	SW71	Sanguisorba	officinalis		SW79	Trichophorum	cespitosum	S	W85	Pinguicula	vulgaris
Strike Induction Strike Stri	SW65	Meananthius	trifoliata	SW71	Trichonhorum	cesnitosum		SW79	Drosera	rotundifolia	S	W85	Platanthra	dilatata
Vivos Technychum perspectivar SVV1 Description Marginaria SVV19 Description description Description Description SVV65 Carses apguation SVV17 Volai \$p SVV19 Carses apguation SVV17 Carses apguation SVV17 Carses SVV17 Carses SVV17 Carses apguation SVV17 Carses SVV17 Carses apguation SVV18 Carses apguation SVV17 Carses ap SVV18 SVV17 Carses ap SVV18 SVV17 Carses ap SVV18 SVV18 SVV18 SVV17 Carses ap SVV18 SV	SW65	Nunbar	nolysonalum	SW/71	Caltha	lentosenala		SW/70	Meananthius	trifoliata	6	11/85	Sphagnum	60
Sortice In-Cohen angle for interm System Cohen System	3005	Tristes a la surves	polysepalum	3W71	Calula	iepiosepaia		SW79	Distantinus	dillotata	0	1000	Spriagnum	sp
Service Latex appliation Strift Strift Strift	5005		cespilosum	50071	Enopriorum	angustiiolium		50079	Platantina	ullalala	3	000	-	-
SNMS Eingehourn angusehlum SNM7 Lepterhera provide and statum SNM7 Curve: angusehlum SNMS Laura articlas STM Patterhera STM STM Curve: angusehlum SNMS Laura Articlas STM Patterhera STM STM Curve: angusehlum SNMS Patterhera StM StM StM StM StM StM Curve: angusehlum SNMS Patterhera StM Patterhera angusehlum StM St	SW65	Carex	aquatilis	SW/1	Viola	sp		SW79	Sanguisorba	officinalis	S	W87a	Salix	sp
SWMS Laptorium production production <td>SW65</td> <td>Eriophorum</td> <td>angustifolium</td> <td>SW71</td> <td>Leptarrhena</td> <td>pyrolifolia</td> <td></td> <td>SW79</td> <td>Carex</td> <td>utriculata</td> <td>S</td> <td>W87a</td> <td>Carex</td> <td>aquatilis</td>	SW65	Eriophorum	angustifolium	SW71	Leptarrhena	pyrolifolia		SW79	Carex	utriculata	S	W87a	Carex	aquatilis
SWKS Lapternhema pyrofibilis SW11 Carex sp SW80 Doycoccos SW87b Carex aduation SWKS Calaba inplicacealia SW12 Simula SW18b Carex aduation SWKS Sarapuschan difficantis SW12 Simula SW18b	SW65	Rubus	arcticus	SW71	Platanthra	dilatata		SW79	Potamogeton	natans	S	W87a	Equisetum	arvense
SW65 Calibra inpotesspale SW72 Saik sp SW80 Protential functiona SW87 Proteining autuitie paleating SW65 Frintmin attica SW72 Saik bart bart<	SW65	Leptarrhena	pyrolifolia	SW71	Carex	sp		SW80	Oxycoccus	oxycoccos	S	W87b	Carex	utriculata
Sives Pietranhm entropy Sives Sives Pietranh Sives Pietranh pairuting Sives Theoremics Sives Theoremics Sives Figure and theoremics Sives Sives Figure and theoremics Sives Figure and theoremics Sives Sives Sives Sives Sives Figure and theoremics Sives Sives <td< td=""><td>SW65</td><td>Caltha</td><td>leptosepala</td><td>SW72</td><td>Salix</td><td>sp</td><td></td><td>SW80</td><td>Potentilla</td><td>fruticosa</td><td>S</td><td>W87b</td><td>Carex</td><td>aquatilis</td></td<>	SW65	Caltha	leptosepala	SW72	Salix	sp		SW80	Potentilla	fruticosa	S	W87b	Carex	aquatilis
SVMS Treinslatis SVM2	SW65	Platanthra	dilatata	SW72	Salix	, barclavi		SW80	Betula	nana	S	W87b	Potentilla	palustris
Synds Singuacha officialis SYN2 Exceptional augusti SYN2 Exceptional augusti SYN2 Exceptional augusti SYN3 Processional SYN3 Processional SYN3 SYN3 <td>SW65</td> <td>Trientalis</td> <td>arctica</td> <td>SW72</td> <td>Trichophorum</td> <td>cespitosum</td> <td></td> <td>SW80</td> <td>Salix</td> <td>sp</td> <td>S</td> <td>W87b</td> <td>Fauisetum</td> <td>arvense</td>	SW65	Trientalis	arctica	SW72	Trichophorum	cespitosum		SW80	Salix	sp	S	W87b	Fauisetum	arvense
 SW65 Prigucular vulgaria SW72 Erisphorum angustfolum SW65 Vervitum vinde SW72 Carex kelgui SW72 Carex kelgui SW72 Carex kelgui SW73 Sub backgris SW80 Carex kelgui SW73 Sub status Sub status SW80 Carex kelgui SW73 Sub status Sub status SW80 Carex kelgui SW73 Sub status Sub status SW80 Carex kelgui SW73 Pyrola Salx kanting SW80 Carex kelgui SW93 Salx ageutilis SW80 Carex ageutilis SW80<td>SW/65</td><td>Sanquisorha</td><td>officinalis</td><td>SW/72</td><td>Sanquisorba</td><td>officinalis</td><td></td><td>SW/80</td><td>Carey</td><td>aquatilis</td><td>ŝ</td><td>11/88</td><td>-</td><td>-</td>	SW/65	Sanquisorha	officinalis	SW/72	Sanquisorba	officinalis		SW/80	Carey	aquatilis	ŝ	11/88	-	-
 Sivisë relation nucleolar sources Sivisë relat	SWEE	Dinguisorba	vulgorio	SW/72	Eriophorum	onquotifolium		SW/90	Trichophorum	aquatins	6	11/00	_	_
String Vestinum String Strin	3005	Filiyuicula	vuigans	3W72	Enopriorum	angusuioiium		3000	Maaaaathiya	cespilosum	0	1009	-	-
svins Epärohum angleintolum svin/1 Latina epitotépäla Siveu Dibéré (Kolmonia Svind Siveu petitic Svins Carex engenteum SVI73 Sala altona epitotépäla Svieu Dibéré (Kolmonia Svind Siveu Petitic Svins Carex angleinteum SVI73 Profa nasrfolia Svike Carex utriculara SVieu Carex aqualis Svike Mania micropyla SVI73 Profa nasrfolia Svike Carex aqualis Svike Svike Carex aqualis Svike Mania micropyla SVI73 Profa nasrfolia Svike Carex aqualis Svike Mania micropyla SVI73 Profa nasrfolia Svike Carex aqualis Svike Mania micropyla SVI73 Profa nasrfolia Svike Svi	5005	veratrum	viride	50072	Carex	sp		50080	Meananthius	tritollata	5	VV90	Salix	barciayi
SVM55 Cenex keloggel SVT3 Salix sitteriensis SVM50 Dosert sp SVM50 Pree sp sp SVM50 Cenex aqualits SVM55 Cenex innosa SVT3 Salix sp is SVM50 Equivalent and sp is SVM50 Cenex aqualits SVM50 Cenex aqualits SVM50 Cenex innosa SVT3 Salix sp is SVM50 SVM50 Equivalent and sp is SVM50 Cenex aqualits SVM50 Cenex innosa SVM51 SVM50 Salix sp is SVM51 Cenex innosa SVM53 Salix sp is SVM51 Cenex innosa SVM53 Salix sp is SVM51 Cenex innosa SVM53 Equivalent in function SVM53 Salix sp is SVM50 Cenex innosa SVM53 Equivalent in the set of SVM51 Cenex innosa SVM53 Equivalent in the set of SVM51 Cenex innosa SVM53 Equivalent in the set of SVM51 Cenex innosa SVM53 Equivalent in the set of SVM51 Cenex innosa SVM53 Equivalent in the set of SVM51 Cenex innosa SVM53 Equivalent in the set of SVM51 Cenex innosa SVM53 Equivalent in the set of SVM51 Cenex in the set	SVV65	Epilobium	angustitolium	SW72	Caltna	leptosepala		SVV80	Drosera	rotunditolia	5	VV90	Salix	sp
SW66 Corex Imosa SW73 Salk reficultific SW80 Springer SW80	SW65	Carex	kelloggii	SW73	Salix	sitchensis		SW80	Drosera	sp	S	W90	Picea	sp
SW66 Vacchium catephoson SW73 Statk sp SW61 - - SW66 Kalmia sp SW73 Fyrola asprill Carse utriculated SW93 Solak sp SW66 Salk sp SW73 Fyrola asprill Calumargers SW93 Solak sp SW66 Maunchiu SW73 Fyrola asprill Calumargers SW93 Caluma aqualita SW66 Maunchiu SW373 Cystopia sp SW94 Precaphorum acgualita annota acgualita SW66 Fringhorum arguatholium SW73 Criptonum acgualita SW94 - - SW66 Splangrum sp SW73 Fringhorum acgualita SW95 Salk barclay SW67 Salk barclay SW73 Carex sp SW82 Carex aqualita SW95 Salk barclay SW95 Salk	SW65	Carex	limosa	SW73	Salix	reticulata		SW80	Equisetum	arvense	S	W90	Carex	aquatilis
SiVie6 Kalminia microghylik SV73 Pyrola asarifolia SV18 Carexe utriculatia SV192 SV166 Solk sp SV173 Fquisetum fluviatile SV18 Equisetum SV193 Carexe aquatilis SV166 Carexe imosa SV173 Finquicula SV181 Sv110 Sv110 Sv193 Carexe aquatilis SV166 Carexe imosa SV173 Tofielidia gluinosa SV182 Pacea sp SV133 Eucleania anerase SV166 Maphar participaria SV173 Contropic opticaria SV182 Pacea sp SV133 Eucleania anerase SV167 Salik spropris SV173 Caronov sp SV122 Particularia SV174 Salik sp SV123 Carexe aquatilis SV174 Salix sp SV122 Suresi sp SV142 Salix sp SV124 Salix sp SV122 Suresi sp SV134 Suresi sp SV145 Suresi sp Sv145 Suresi sp Sv145 Suresi sp Sv144 Suresi sp<	SW66	Vaccinium	caespitosum	SW73	Salix	sp		SW80	Sphagnum	sp	S	W91	-	-
SYN66 Salk Sp SVN3 Viola sp SVN4 Equisetum fluviabile SVN3 Solic sp SYN66 Manarahtus SVN3 S	SW66	Kalmia	microphylla	SW73	Pyrola	asarifolia		SW81	Carex	utriculata	S	W92	-	-
SW66 Meananthus infoldan SW73 Equisatum Iluviagite SW14 Calimagnosts SW33 Carex aqualitis SW66 Cnerx Imosa SW173 Toflethila glutinosa SW14 Salix sp SW33 Platatura dalibatis SW66 Nuphar polysepalum SW173 Toflethila glutinosa SW12 Salix barclayi SW33 Equatum arenessa SW66 Eriophorum angustifolium SW173 Eriophorum chamissonis SW82 Salix cornmutata SW33 Equatum arenessa SW66 Splangrum Sp SW173 Fedicularis cornmutata SW182 Carex aqualitis SW14 Salix barclayi SW173 Equitaritis SW173	SW66	Salix	sp	SW73	Viola	SD		SW81	Equisetum	fluviatile	S	W93	Salix	SD
SW68 Carex itnosa SW73 Projectia rule and planes SW8 Safe sp SW83 Petantra rdialata SW66 Nichaphorum cspitosum SW73 Crances SW83 Lancus balticus SW66 Nichaphorum apgustfolium SW73 Crances sp SW82 Selix SW33 Equisethum anvense SW66 Sinphorum apgustfolium SW73 Eriophorum angustfolium SW82 Senecio triangularis SW34 - <td>SW66</td> <td>Meananthius</td> <td>trifoliata</td> <td>SW73</td> <td>Fauisetum</td> <td>fluviatile</td> <td></td> <td>SW81</td> <td>Calamagrostis</td> <td>canadensis</td> <td>S</td> <td>W93</td> <td>Carex</td> <td>aquatilis</td>	SW66	Meananthius	trifoliata	SW73	Fauisetum	fluviatile		SW81	Calamagrostis	canadensis	S	W93	Carex	aquatilis
SVM68 Trichophorum cespitosum SV73 Toffeldia gluinosas SVM2 Salik beröbyi SVM3 Luncus balicus balicus SVM68 Nuphar polyespalum SV73 Eriophorum chamissonis SVM2 Salik commutata SVM3 Eriophorum angustfolum SV73 Eriophorum angustfolum SVM73 Eriophorum angustfolum SVM73 Eriophorum angustfolum SVM73 Eriophorum angustfolum SVM73 Eriophorum angustfolum SVM2 Salik barclayi SVM4 Laptarthena gluinosa SVM68 Suma Suma SVM73 Eriophorum angustfolum SVM2 Salik barclayi SVM5 Salik barclayi SVM7 Salik barclayi SVM7 Pedicularis ornithorhyncha SVM82 Platanthra dilatata SVM5 Salik barclayi SVM7 Carex aqualiis SVM7 Salik spp SVM73 Eriophorum angustfolum SVM2 Equisetum anvense SVM5 Salik barclayi SVM7 Carex aqualiis SVM7 Salik aparclayi SVM7 Salik aparclayi SVM2 Equisetum anvense SVM5 Salik barclayi SVM67 Carex aqualiis SVM7 Salik barclayi SVM2 Equisetum anvense SVM5 Salik barclayi SVM67 Laptarthena pyrolifolia SVM74 Salik barclayi SVM82 Pedicularis ornithorhyncha SVM35 Mneum sp SVM67 Eriophorum angustfolum SVM74 Rubus arcticus SVM22 Equisetum anvense SVM35 Sanguisoba dificinalis SVM36 Laptarthena pyrolifolia SVM74 Rubus arcticus SVM22 Equisetum anvense SVM36 Laptarthena pyrolifolia SVM74 Rubus arcticus SVM22 Eriophorum angustfolum SVM36 Laptarthena pyrolifolia SVM74 Equisetum anvense SVM23 Laptarthena pyrolifolia SVM74 Rubus arcticus SVM22 Eriophorum angustfolum SVM36 Sanguisoba dificinalis SVM23 Laptarthena pyrolifolia SVM74 Salik carex aqualiis SVM33 Baluk anara SVM86 Sanguisoba dificinalis SVM38 Catha leptaspala SVM74 Salik barclayi SVM33 Garex aqualitis SVM36 Catha leptaspala SVM74 Salik bardcayi SVM38 Garex aqualitis SVM38 Catha leptaspala SVM74 Carex aqualitis SVM38 Garex aqualiti	SW/66	Carey	limosa	SW/73	Pinquicula	vulgaris		SW/81	Saliv	sn	ŝ	11/03	Platanthra	dilatata
sing indugation constraints in the second se	SWEE	Trichonhorum	aconitosum	SW/73	Tofioldio	dutinono		SW07	Solix	borolovi	6	11/02	lunouo	haltious
Sivies Industria polysidalum Sivi 3 Constraints Sivi 2 Picka sp Sivi 2 Picka sp Sivi 3 Enginnum argustificitum argustificitum SW66 Sphagrum sp SW73 Enginnum angustificitum SW82 Senecio triangularis SW94 -	5000	Number	cespilosum	50073	Toneidia Oscistas e la	giulinosa		5002	Salix	Darciayi	3	W93	Juncus	Dallicus
SW66 Endphorum angustfolum SW73 Endphorum angustfolum SW66 Spinagrum sp SW73 Pedicularis ornithorhynchna SW82 Senecic triangularis SW94 sin sin SW67 Salix barclayi SW73 Pedicularis ornithorhynchna SW82 Carex aquatilis SW95 Leptarthena gluaistum anvense SW96 Carex aquatilis SW974 Salix sp SW82 Sengusorba officinalis SW975 Leptarthena pyrolfoloia SW974 Salix barity SW82 Pedicularis ornithorhyncha SW95 Mneum sp SW67 Carlas aquatilis SW74 Salix barity SW82 Erophorum agustfolum SW96 Leptarthena pyrolfoloia SW96 Leptarthena pyrolfoloia SW96 Leptarthena pyrolfoloia SW96 Leptarthena pyrolfoloia SW96 Calta Leptosepala SW74 Carex aquatalis <td>5000</td> <td>Nupnar</td> <td>polysepalum</td> <td>50073</td> <td>Oxytropis</td> <td>sp</td> <td></td> <td>50082</td> <td>Picea</td> <td>sp</td> <td>5</td> <td>VV93</td> <td>Equisetum</td> <td>arvense</td>	5000	Nupnar	polysepalum	50073	Oxytropis	sp		50082	Picea	sp	5	VV93	Equisetum	arvense
SW66 Sphagnum sp SW73 Eriophorum angustifolium SW82 Senecio tringularis SW44 - - SW67 Saink spp SW73 Carex sp SW82 Carex aqualitis SW45 Saink sp SW67 Saink spp SW73 Carex sp SW82 Carex aqualitis SW45 Leptarthena pyrolibia SW67 Equisetum arvense SW74 Saink barn SW82 Padicularitis SW45 Leptarthena pyrolibia SW55 Saink bargustoha officinalis SW74 Saink bargustoha officinalis SW74 Saink bargustoha officinalis SW74 Saink bargustoha officinalis SW75 Saink bargustoha officinalis SW74 Saink bargustoha officinalis SW74 Saink bargustoha officinalis SW75 Saink bargustoha officinalis SW74 Saink bargustoha	SW66	Eriophorum	angustifolium	SW73	Eriophorum	chamissonis		SW82	Salix	commutata	S	W93	Eriophorum	angustitolium
SW67 Salik barclayi SW73 Pedicularis ornality SW82 Planathra dilatata SW85 Salik barclayi SW67 Salik spp SW74 Salik sp SW82 Carex aqualilis SW85 Carex aqualilis SW85 Carex aqualilis SW85 Carex aqualilis SW87 Carex aqualilis	SW66	Sphagnum	sp	SW73	Eriophorum	angustifolium		SW82	Senecio	triangularis	S	W94	-	-
SW67 Salix spp SW73 Carex sp SW82 Carex aquatilis SW95 Carex aquatilis SW67 Carex aquatilis SW74 Salix sp SW82 Equisetum arverse SW95 Carex aquatilis SW67 Equisetum arverse SW95 Merum sp SW67 Enophorum angustiolium SW74 Salix brait SW82 Pedicularis ornithrinkis SW95 Sanguisorba SW95 Sanguisorba SW95 Sanguisorba SW96 Salix sp SW67 Caritha leptosepala SW74 Rulus arctricus SW82 Equisertum furviaite SW96 Equisertum arverse SW67 Catitha leptosepala SW74 Equisertum arverse SW82 Enciphorum anguisfolium SW96 Enciphorum aguisfolium SW96 Carex aquatilis SW83 Salix sp SW96 Enciphorum aguisfolium SW96 Carex aquisfolium SW96 Carex aquatilis SW96 Carex aquisfolium SW96 Carex aquisfolium SW96 Carex aquisfolium S	SW67	Salix	barclayi	SW73	Pedicularis	ornithorhyncha		SW82	Platanthra	dilatata	S	W95	Salix	barclayi
SW67 Carex aquellis SW74 Salix sp SW22 Sanguisorba officinalis SW95 Leptarthema pyrollola SW67 Leptarthema pyrollolia SW74 Salix control SW82 Pedicularis omithorhyncha SW95 Sanguisorba SW95 Salix sp SW96 Salix sp SW96 Enciphorum arguistolia	SW67	Salix	spp	SW73	Carex	sp		SW82	Carex	aquatilis	S	W95	Carex	aquatilis
SW67 Equisetum arvense SW74 Saik commutate SW82 Equisetum arvense SW95 Sanguisoba officinalis SW67 Eriophorum angustifolium SW74 Saik barle SW82 Pyrola asanfolia SW95 Sw96 Saik spp SW67 Caltha leptorsepala SW74 Rubus articus SW82 Explorhorum asanfolia SW96 Saik spp SW67 Caltha leptosepala SW74 Rubus articus SW82 Explorhorum apustfolium SW96 Sangustoba officinalis SW68 Caltha leptosepala SW74 Carex equilitis SW83 Salix commutata SW96 Pranthra dilatata SW68 Caltha leptosepala SW74 Equisetum fluvatite SW83 Salix sp SW96 Carex aquatilis SW83 Salix sp SW96 Carex aquatatata SW96	SW67	Carex	aquatilis	SW74	Salix	sp		SW82	Sanguisorba	officinalis	S	W95	Leptarrhena	pyrolifolia
ŚWR7 Leptermena pyrotificial SW74 Salik barclayi SW82 Pedicularis omithorhyncha SW95 Menum spin SWR7 Eriophorum angustificium SW74 Salik reticulata SW82 Pyrola astrificia SW96 Leptarhena pyrolifolia SW96 Leptarhena SW96 Leptarhena pyrolifolia SW96 Leptarhena pyrolifolia SW96 Leptarhena pyrolifolia SW96 Leptarhena pyrolifolia SW96 Calita Leptarhena pyrolifolia SW96 Calita Leptarhena pyrolifolia SW96 Calita Leptarhena Leptarhena Leptarhena </td <td>SW67</td> <td>Equisetum</td> <td>arvense</td> <td>SW74</td> <td>Salix</td> <td>, commutata</td> <td></td> <td>SW82</td> <td>Equisetum</td> <td>arvense</td> <td>S</td> <td>W95</td> <td>Sanguisorba</td> <td>officinalis</td>	SW67	Equisetum	arvense	SW74	Salix	, commutata		SW82	Equisetum	arvense	S	W95	Sanguisorba	officinalis
SW67 Eriophorum angustifolium SW74 Satix reticulata SW82 Pyrola asartolianus SW86 Satix spp SW67 Sanguisorba officinalis SW74 Rubus arcitulas SW82 Equisetum fluviatile SW96 Laptarnhena pyrolifolia SW67 Sanguisorba officinalis SW74 Sanguisorba officinalis SW96 Laptarnhena pyrolifolia SW96 Sanguisorba officinalis SW96 Sanguisorba officinalis SW96 Sanguisorba officinalis SW96 Sanguisorba officinalis SW974 Pedicularis ornithorityncha SW83 Salix spo SW96 Caltha leptosepala SW74 Equisetum fluviatile SW83 Salix spo SW96 Caltha leptosepala SW74 Equisetum fluviatile SW83 Salix spo SW96 Caltha leptosepala SW74 Equisetum fluviatile SW83 Carex aquatilis SW96 Caltha leptosepala SW75 Salix spo SW96 Caltha </td <td>SW67</td> <td>l entarrhena</td> <td>pyrolifolia</td> <td>SW74</td> <td>Salix</td> <td>barclavi</td> <td></td> <td>SW82</td> <td>Pedicularis</td> <td>ornithorhyncha</td> <td>S</td> <td>W95</td> <td>Mneum</td> <td>sn</td>	SW67	l entarrhena	pyrolifolia	SW74	Salix	barclavi		SW82	Pedicularis	ornithorhyncha	S	W95	Mneum	sn
SW67 Calita digualization of the second seco	SW/67	Erionhorum	angustifolium	SW/74	Salix	reticulata		SW82	Pyrola	asarifolia	ŝ	11/96	Saliy	spn
SW07 Califia billionianis SW174 Sauguisorba SW174 Sw174 Valuestum arvense SW82 Eriophorum angustifolium SW174 Patauthran angustifolium SW174 Califia SW174 Sw174 Valuestum SW183 Salix commutate SW196 Patanthran angustifolium SW174 Carex aquatilis SW183 Califia nana SW196 Patanthran angustifolium arvense SW168 Caliha leptosepala SW175 Salix barclayi SW83 Carex aquatilis SW196 Califia leptosepala SW168 Trientalis arctica SW175 Salix barclayi SW84 Salix sp SW196 Califia guatilis SW196 Califia guatilis SW196 Califia guatilis SW196 Califia guatilis SW196 Califia guatilis </td <td>SW67</td> <td>Songuioorho</td> <td>officinalia</td> <td>SW74</td> <td>Dubuo</td> <td>orotious</td> <td></td> <td>SW02</td> <td>Equipotum</td> <td>fluviotilo</td> <td>6</td> <td>1006</td> <td>Lontarrhono</td> <td>spp</td>	SW67	Songuioorho	officinalia	SW74	Dubuo	orotious		SW02	Equipotum	fluviotilo	6	1006	Lontarrhono	spp
SW07 Calina leptoseplara SW14 Sanguisorba olimicinals SW62 Leptaintrena pyronitolia SW96 Equisetum arrense SW08 Eriophorum arguistothium SW14 Pedicularis ornithorhynocha SW83 Salix commutata SW96 Platanthra difficinalis SW08 Caltha leptoseplara SW74 Equisetum flurinalite SW83 Salix sop SW96 Caltha leptoseplara SW96 SW96 Caltha leptoseplara SW96 SW96 SW96 Caltha leptoseplara SW96 SW96 Caltha leptoseplara SW96 SW96 Caltha leptoseplara SW96 SW96 Caltha leptoseplara SW96 SW96 SW96 Caltha leptoseplara<	SW07	Sariyuisuba	Unicinalis	3W74	Rubus Octobria sub s	alcucus		3VV02	Equiselum	nuvidule	0	W90	Eeptannena	pyrolliolla
SWR1 Springrium sp SWR4 Equiselum arvense SWR2 Endphorum angustitolum SWR4 Genomenates SWR8 Caltha leptosepala SWR4 Carex aqualilis SWR3 Selua nana SW96 Eriophorum adjustitolum SW86 Selua nana SW96 Eriophorum adjustitolum SW86 Selua nana SW96 Caltha leptosepala SW87 Selua SW88 Selua nana SW96 Caltha leptosepala SW86 Selua SW86 Caltha sprint adjustitolum SW96 Caltha leptosepala SW88 Selua SW96 SW96 Caltha leptosepala SW96 SW96 </td <td>50007</td> <td>Califia</td> <td>iepiosepaia</td> <td>SVV74</td> <td>Sanguisorba</td> <td>onicinalis</td> <td></td> <td>5002</td> <td>Leplannena</td> <td>pyrolliolla</td> <td>3</td> <td>VV90</td> <td>Equiselum</td> <td>arvense</td>	50007	Califia	iepiosepaia	SVV74	Sanguisorba	onicinalis		5002	Leplannena	pyrolliolla	3	VV90	Equiselum	arvense
SW68 Erophorum angustifolium SW74 Pedicularis ornitoritatis SW83 Salix commutata SW96 Pelatanthra oillatata SW68 Caltha leptosepala SW74 Carex aquatilis SW83 Salix spp SW96 Caltha leptosepala SW68 Sanjusorba officinalis SW75 Salix barclayi SW83 Carex aquatilis SW96 Caltha leptosepala SW68 Platanthra dilatata SW75 Salix sp SW83 Carex aquatilis SW96 Carex aquatilis SW68 Trientalis arcticus SW75 Carex aquatilis SW84 Ledux groenandcucus SW96 Pedicularis sp SW68 Trichophorum cespitosum SW76 Salix sp SW84 Alnus sp SW96 Sphagnum sp SW68 Senecio triangularis SW76 Carex aquatilis SW84 Alnus sp SW68 Senecio triangularis SW76	SVV67	Spnagnum	sp	SW74	Equisetum	arvense		SVV82	Eriopnorum	angustifolium	5	VV96	Sanguisorba	officinalis
SW88 Catha leptosepala SW74 Carex aquitilis SW83 Betula nane SW96 Eriophorum argustifolum SW88 Sanguisorba officinalis SW77 Salix barlow SW83 Carex spp SW96 Calha leptosepala SW88 Equisetum arvense SW75 Salix sp SW83 Carex aquatilis SW96 Carex aquatilis SW88 Trientalis arctica SW75 Carex aquatilis SW84 Salix sp SW96 Pedicularis sp SW88 Trientalis arctica SW76 Salix cormutata SW84 Ledum greenlandicum SW96 Sphagnum sp SW88 Trichophorum cespitosum SW76 Salix sp SW84 Salix barclayi SW88 Senecio triangularis SW84 Carex aquatilis SW84 Salix sp SW66 Sphagnum sp SW66 Carex aquatilis SW84 Salix barclayi	SW68	Eriophorum	angustifolium	SW74	Pedicularis	ornithorhyncha		SW83	Salix	commutata	S	W96	Platanthra	dilatata
SW88 Sanguisorba officinalis SW74 Equisetum fituvalitie SW83 Salix spp SW96 Caltha leptosepala SW88 Equisetum arvense SW75 Salix sp SW83 Carex aquatilis SW96 Caltha leptosepala SW88 Platanthra dilatata SW75 Salix sp SW83 Carex aquatilis SW96 Carex aquatilis SW88 Trinchophorum cespitosum SW76 Salix barclayi SW84 Ledum groenlandicum SW96 Sphagnum sp SW88 Trinchophorum cespitosum SW76 Salix sp SW84 Salix barclayi SW84 Salix barclayi SW84 Salix barclayi SW86 Shagnum sp SW96 Viola sp SW96 Sphagnum sp SW68 Salix sp SW76 Salix sp SW84 Carex aquatilis SW96 Sw96 Sw96 Sw96 Sphagnum sp SW96 Sp	SW68	Caltha	leptosepala	SW74	Carex	aquatilis		SW83	Betula	nana	S	W96	Eriophorum	angustifolium
SW68Equisetum PlatanthraarvenseSW75SalixspackyiSW83Carex CarexutriculataSW66Viola valualiisspSW88Trientalis arcticaSW75SalixspSW83Carex aquatilisspSW96Carex aquatilisspSW88Rubus arcticusarcticusSW76SalixbarclayiSW84Salix spspSW96Pedicularis spspSW88Rubus arcticusarcticusSW76Salix commutataSW84Ledum sourcegroenlandicumSW96Sphagnum spSW88Viola spspSW76Salix commutataspSW84Alnus spspSW88Senecio triangularisSW76Carex equatilisaquatilisSW84Alnus valualitisspSW88Shagnum spspSW76Platanthra equatilitieavenseSW84Carex carex aquatilisspSW88Shagnum spspSW76Platanthra equatilitieSW84Carex carex aquatilisspspSW69Nuphar polysepalumsW76Platanthra equatilitieSW84Carex carex 	SW68	Sanguisorba	officinalis	SW74	Equisetum	fluviatile		SW83	Salix	spp	S	W96	Caltha	leptosepala
SW68PlatenthradilatataSW75SalixspSW83CarexaquatilisSW96CarexaquatilisSW68TricentalisarcticusSW75CarexaquatilisSW84SalixspSW96PedicularisspSW68RubusarcticusSW76SalixbarclayiSW84LedumgroenlandicumSW96SplagnumspSW68TrichophorumcespitosumSW76SalixcommutataSW84RubusarcticusSW96SplagnumspSW68SeneciotriangularisSW76SalixcommutataSW84AlnusspspspspSW68ShagnumspSW76CarexaquatilisSW84AlnusspspspspspSW68ShagnumspSW76CarexaquatilisSW84AlnusspspspspspspspSW68SphagnumspSW76CarexaquatilisSW84Carexaquatilissp <td>SW68</td> <td>Equisetum</td> <td>arvense</td> <td>SW75</td> <td>Salix</td> <td>barclayi</td> <td></td> <td>SW83</td> <td>Carex</td> <td>utriculata</td> <td>S</td> <td>W96</td> <td>Viola</td> <td>sp</td>	SW68	Equisetum	arvense	SW75	Salix	barclayi		SW83	Carex	utriculata	S	W96	Viola	sp
SW68Trientalis RubusarcticasSW75Carex SalixaquatilisSW84SalixspSW96PedicularisspSW68Rubus RubusarcticusSW76Salix SalixbarclayiSW84Ledum groenlandicumSW96PedicularisspSW68Viola SpspSW76Salix SalixcommutataSW84Rubus SalixbarclayiSW68Viola SeneciotriangularisSW76Carex Equisetum arvenseSW84Alnus OxycoccusspSW68Senecio triangularisSW76Equisetum arvenseSW84Alnus OxycoccusspSW68Sphagnum SpSW76Equisetum arvenseSW84Carex Carex aquatilisaquatilisSW69Caltha leptosepalaSW76Equisetum fluviatileSW84Carex Carex aquatilisaquatilisSW69Caltha leptosepalaSW76Equisetum fluviatileSW84Carex Carex aquatilisana spSW69Caltha leptosepalaSW76Mneum SpSW85Betula nanananaSW70Carex carex limosaSW77Carex carex uticiataSW85Rubus carex arcticusarcticusSW70Carex leptosepalaSW77Salix contortaSW85Empetrum nigrumnanaSW70Carex leptosepalaSW77Relwis arcticusSW85Empetrum nigrumsySW70Carex leptosepala<	SW68	Platanthra	dilatata	SW75	Salix	sp		SW83	Carex	aquatilis	S	W96	Carex	aquatilis
SW68Rubus Rubus Trichophorum espitosumSW76Salix Salix SW76barclayiSW84Ledum Rubus SW84groenlandicum arcicusSW96Sphagnum spspSW68Viola SpspSW76Salix Salix SpspSW84Rubus Salix barclayiarclicusSW68Viola SpspSW76Salix Carex aquatilisspSW84Alnus SpspSW68Senecio triangularisSW76Carex Equisetum arvenseSW84Alnus SpspSW68Sphagnum spspSW76Platanthra dilatatSW84Oxycoccus CorcusoxycoccosSW69Nuphar PolysepalumsW76Juncus JuncusbalticusSW84Carex Carex aquatilisdificinalisSW69Carex CarexspSW76Tofieldia glutinosaSW84Sphagnum SpspSW70Kalmia microphyllaSW76Tofieldia glutinosaSW85Betula nanananaSW70Carex SangiosohaSW77Carex atik trichophorum spspSW76Salix balix balticusSW85Betula arclicusSW70Caltha leptosepalaSW77Carex Carex throophorum capitoshaSW77Carex carex trinosaSW85Caltha caresnanaSW70Caltha leptosepalaSW77Carex carex throophorum spSW78Caltha caleptosepalaSW79Rubus carelayiS	SW68	Trientalis	arctica	SW75	Carex	aquatilis		SW84	Salix	sp	S	W96	Pedicularis	sp
SW68TrichophorumCespitosumSW76SalixcommutataSW84RubusarcticusSW68ViolaspSW76SalixspSW84SalixbarclayiSW68SeneciotriangularisSW76CarexaquatilisSW84AlnusspSW68SeneciotriangularisSW76CarexaquatilisSW84AlnusspSW68KalmiamicrophyllaSW76EquisetumarvenseSW84OxycoccusoxycoccosSW68SphagnumspSW76PlatanthradilatataSW84CarexaquatilisSW69CalthaleptosepalumSW76JuncusbalticusSW84CarexaquatilisSW69CarexspSW76FinguiculavulgarisSW84SanguisorbaofficinalisSW69CarexspSW76TofieldiaglutinosaSW84SanguisorbaofficinalisSW70CarexlimosaSW77SalixbarclayiSW85RubusarcticusSW70CalthaleptosepalaSW77CarexutriculataSW85LedumgroenlandicumSW70SangusorbaofficinalisSW79RubusarcticusSW85GautheriahumitusaSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccosSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85Sanguisorba <td>SW68</td> <td>Rubus</td> <td>arcticus</td> <td>SW76</td> <td>Salix</td> <td>, barclavi</td> <td></td> <td>SW84</td> <td>Ledum</td> <td>, aroenlandicum</td> <td>S</td> <td>W96</td> <td>Sphaanum</td> <td>sp</td>	SW68	Rubus	arcticus	SW76	Salix	, barclavi		SW84	Ledum	, aroenlandicum	S	W96	Sphaanum	sp
SW68ViolaSpSW76SalixSpSW84NausSalixbarclayiSW68SeneciotriangularisSW76CarexaquatilisSW84AlnusspSW68KalmiamicrophyllaSW76EquisetumarvenseSW84PiceaspSW68SphagnumspSW76PlatanthradilatataSW84OxycoccusoxycoccosSW69NupharpolysepalumSW76PlatanthradilatataSW84CarexaquatilisSW69CalthaleptosepalaSW76EquisetumfluviatileSW84CarexutriculataSW69CalthaleptosepalaSW76FonguiculavulgarisSW84SanguisorbaofficinalisSW69CarexspSW76TofieldiaglutinosaSW85BetulananaSW70KalmiamicrophyllaSW77SalixbarclayiSW85RubusarcticusSW70CarexlimosaSW77CarexutriculataSW85LedumgroenlandicumSW70CalthaleptosepalaSW77CarexutriculataSW85GaultheriahumitusaSW70LeptarrhenapyrolifoliaSW79PiuscontortaSW85OxycoccusoxycoccosSW70LeptarrhenapyrolifoliaSW79PiuscontortaSW85OxycoccusoxycoccosSW70LeptarrhenapyrolifoliaSW79PiuscontortaSW85	SW/68	Trichonhorum	cesnitosum	SW/76	Saliy	commutata		SW84	Rubus	arcticus	-		-p	-1-
SW00ViolaSPSW05SailxSPSW04SailxDatappSW06SeneciotriangularisSW76CarexaquatilisSW84AlnusspSW68KalmiamicrophyllaSW76EquisetumarvenseSW84PiceaspSW68SphagnumspSW76PlatanthradilatataSW84OxycoccusoxycoccosSW69NupharpolysepalumSW76EquisetumfluviatileSW84CarexaquatilisSW69CalthaleptosepalaSW76PinguiculavulgarisSW84SanguisorbaofficinalisSW69CarexspSW76TofieldiaglutinosaSW84SanguisorbaofficinalisSW70KalmiamicrophyllaSW76MneumspSW85BetulananaSW70CarexlimosaSW77CarexutriculataSW85LedumgroenlandicumSW70SanguisorbaofficinalisSW77CarexutriculataSW85GaultheriahumifusaSW70SanguisorbaofficinalisSW79PinuscontortaSW85OxycoccusoxycoccosSW70LeptarthenapyrolifoliaSW79PinuscontortaSW85SanguisorbaofficinalisSW70LeptarthenapyrolifoliaSW79PinuscontortaSW85PiceaspSW70EquisetumarceusSW85SanguisorbaofficinalisSW70 </td <td>SIM69</td> <td>Violo</td> <td>ccopitosum</td> <td>SW76</td> <td>Solix</td> <td>commutata</td> <td></td> <td>C11/04</td> <td>Soliv</td> <td>borolovi</td> <td></td> <td></td> <td></td> <td></td>	SIM69	Violo	ccopitosum	SW76	Solix	commutata		C11/04	Soliv	borolovi				
SW60SelfectoInaliguialitisSW70CarexaquatilitisSW64AinusSpSW68KalmiamicrophyllaSW76EquisetumarvenseSW84PiceaSpSW69NupharpolysepalumSW76JuncusbalticusSW84CarexaquatilisSW69CalthaleptosepalaSW76EquisetumfluviatileSW84CarexaquatilisSW69CalthaleptosepalaSW76EquisetumfluviatileSW84SaquisorbaofficinalisSW69CarexspSW76TofieldiaglutinosaSW84SphagnumspSW70KalmiamicrophyllaSW76MeumspSW85BetulananaSW70CarexlimosaSW77SalixbarclayiSW85LedumgroenlandicumSW70CalthaleptosepalaSW77CarexutriculataSW85LedumgroenlandicumSW70SanguisorbaofficinalisSW79RubusarcticusSW85GaultheriahumitusaSW70SanguisorbaofficinalisSW79RubusarcticusSW85DiceaspSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85DiceaspSW70EquisetumarcticusSW85DiceaspspSW70EquisetumarcticusSW85DiceaspSW70EquisetumarcticusSW85Picea	5000	Viola	sµ	SW/0	Corov	sp		SW04	Salix	Darciayi				
SW68KalmiaImicrophyliaSW76EquisetumarvenseSW84PiceaspSW68SphagnumspSW76PlatanthradilatataSW84OxycoccusoxycoccosSW69NupharpolysepalumSW76JuncusbalticusSW84CarexaquatilisSW69CalthaleptosepalaSW76EquisetumfluviatileSW84CarexutriculataSW69CarexspSW76PinguiculavulgarisSW84SanguisorbaofficinalisSW69CarexspSW76TofieldiaglutinosaSW84SphagnumspSW70KalmiamicrophyllaSW76MneumspSW85BetulananaSW70CarexlimosaSW77CarexutriculataSW85LedumgroenlandicumSW70CatthaleptosepalaSW77CarexutriculataSW85GaultheriahumifusaSW70TrichophorumcespitosumSW78EquisetumarvenseSW85GaultheriahumifusaSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccusSW70EquisetumangustifoliumSW79PinuscontortaSW85OxycoccusoxycoccusSW70EquisetumangustifoliumSW79PinuscontortaSW85SanguisorbaofficinalisSW70EquisetumangustifoliumSW79PiceaspS	50000	Seriecio	inangularis	50070	Carex	aquauns		5004	Ainus	sp				
SW68SphagnumspSW76PlatanthradilatataSW84OxycoccusoxycoccosSW69NupharpolysepalumSW76JuncusbalticusSW84CarexaquatilisSW69CalthaleptosepalaSW76EquisetumfluviatileSW84CarexaquatilisSW69CarexspSW76PinguiculavulgarisSW84SanguisorbaofficinalisSW69CarexspSW76TofieldiaglutinosaSW84SphagnumspSW70KalmiamicrophyllaSW76MneumspSW85BetulananaSW70CarexlimosaSW77SalixbarclayiSW85RubusarcticusSW70CalthaleptosepalaSW77CarexutriculataSW85LedumgroenlandicumSW70TrichophorumcespitosumSW78EquisetumarvenseSW85GaultheriahumifusaSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccusSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85SanguisorbaofficinalisSW70EquisetumarvensespSW85DiscusoxycoccusoxycoccusSW70EquisetumarvensespSW85ConcusoxycoccusSW70EquisetumarvensespSW85SanguisorbaofficinalisSW70Equisetumarv	SVV68	Kaimia	micropnylia	SW/6	Equisetum	arvense		SVV84	Picea	sp				
SW69NupharpolysepalumSW76JuncusbalticusSW84CarexaquatilisSW69CalthaleptosepalaSW76EquisetumfluviatileSW84CarexutriculataSW69CarexspSW76PringuiculavulgarisSW84SanguisorbaofficinalisSW69CarexspSW76TofieldiaglutinosaSW84SphagnumspSW70KalmiamicrophyllaSW76MneumspSW85BetulananaSW70CarexlimosaSW77SalixbarclayiSW85RubusarcticusSW70CalthaleptosepalaSW77CarexutriculataSW85LedumgroenlandicumSW70CalthaleptosepalaSW77CarexutriculataSW85GaultheriahumifusaSW70SanguisorbaofficinalisSW79RubusarcticusSW85EmpetrumnigrumSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccosSW70EquisetumarcenseSW79PiceaspSW85SanguisorbaofficinalisSW70EquisetumarcenseSW79PiceaspSW85SanguisorbaofficinalisSW70EquisetumarcenseSW79PiceaspSW85SanguisorbaofficinalisSW70EquisetumarcenseSW79DeclumgroenlandicumSW85Sanguis	SW68	Sphagnum	sp	SW76	Platanthra	dilatata		SW84	Oxycoccus	oxycoccos				
SW69CalthaleptosepalaSW76EquisetumfluviatileSW84CarexutriculataSW69EriophorumangustifoliumSW76PinguiculavulgarisSW84SanguisorbaofficinalisSW69CarexspSW76PingliculaglutinosaSW84SanguisorbaofficinalisSW70KalmiamicrophyllaSW76MneumspSW85BetulananaSW70CarexlimosaSW77SalixbarclayiSW85LedumgroenlandicumSW70CalthaleptosepalaSW77CarexutriculataSW85LedumgroenlandicumSW70TrichophorumcespitosumSW78EquisetumarvenseSW85GaultheriahumifusaSW70SanguisorbaofficinalisSW79PinuscontortaSW85DaycoccusoxycoccosSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85SanguisorbaofficinalisSW70EquisetumarvenseSpSW85PiceaspSW76SW70LeptarrhenapyrolifoliaSW79PiceaspSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79DiceaspSW85PiceaspSW70EquisetumarvenseSW79Sw85PiceaspSW70EquisetumarvenseSW85SanguisorbaofficinalisSW70Equisetumarvense<	SW69	Nuphar	polysepalum	SW76	Juncus	balticus		SW84	Carex	aquatilis				
SW69EriophorumangustifoliumSW76PinguiculavulgarisSW84SanguisorbaofficinalisSW69CarexspSW76TofieldiaglutinosaSW84SphagnumspSW70KalmiamicrophyllaSW76TofieldiaglutinosaSW85BetulananaSW70CarexlimosaSW77SalixbarclayiSW85RubusarcticusSW70CarexlimosaSW77CarexutriculataSW85LedumgroenlandicumSW70CalthaleptosepalaSW77CarexutriculataSW85GaultheriahumifusaSW70TrichophorumcespitosumSW78EquisetumarcticusSW85GaultheriahumifusaSW70SanguisorbaofficinalisSW79PinuscontortaSW85OxycoccusoxycoccosSW70LeptarrhenapyrolifoliaSW79PiceaspSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79DiceaspSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85SanguisorbaofficinalisSW71BetulananaSW85Equisetum	SW69	Caltha	leptosepala	SW76	Equisetum	fluviatile		SW84	Carex	utriculata				
SW69CarexspSW76TofieldiaglutinosaSW84SphagnumspSW70KalmiamicrophyllaSW76MneumspSW85BetulananaSW70CarexlimosaSW77SalixbarclayiSW85RubusarcticusSW70CalthaleptosepalaSW77CarexutriculataSW85LedumgroenlandicumSW70TrichophorumcespitosumSW78EquisetumarvenseSW85GaultheriahumifusaSW70SanguisorbaofficinalisSW79RubusarcticusSW85EmpetrumnigrumSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccosSW70EquisetumarvenseSW79PiceaspSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79DiceaspSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79DiceaspSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79DiceaspSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79BetulananaSW85PireaspSW70EquisetumarvenseSW79BetulananaSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79EmpetrumnigrumSW85Equisetumfibrin	SW69	Eriophorum	angustifolium	SW76	Pinguicula	vulgaris		SW84	Sanguisorba	officinalis				
SW70KalmiamicrophyllaSW76MneumspSW85BetulananaSW70CarexlimosaSW77SalixbarclayiSW85RubusarcticusSW70CalthaleptosepalaSW77CarexutriculataSW85LedumgroenlandicumSW70TrichophorumcespitosumSW78EquisetumarvenseSW85GaultheriahumifusaSW70SanguisorbaofficinalisSW79RubusarcticusSW85EmpetrumnigrumSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccosSW70EquisetumarvenseSW79PiceaspSW85PiceaspSW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79DiceaspSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85ParnassiafimbriataSW71PinuscontortaSW79EmpetrumnigrumSW85EquisetumfluviatileSW71PinuscontortaSW79CarexaquatilisSW85Contuscanadensis	SW69	Carex	sp	SW76	Tofieldia	glutinosa		SW84	Sphagnum	sp				
SW70CarexlimosaSW77SalixbarclayiSW85RubusarcticusSW70CalthaleptosepalaSW77CarexutriculataSW85LedumgroenlandicumSW70TrichophorumcespitosumSW78EquisetumarvenseSW85GaultheriahumifusaSW70TrichophorumcespitosumSW79PinuscontortaSW85GaultherianigrumSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccosSW70EquisetumarvenseSW79PiceaspSW85PiceaspSW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85ParnassiafimbriataSW71BetulananaSW79CarexaquatilisSW85CornuscanadensisSW71PinuscontortaSW79CarexaquatilisSW85Cornuscanadensis	SW70	Kalmia	, microphylla	SW76	Mneum	sp		SW85	Betula	nana				
SWT0CalityInitialitySWT0TraduusdirectionsSW70CalityleptosepalaSWT7CarexutriculataSW85LedumgreenlandicumSW70TrichophorumcespitosumSW78EquisetumarvenseSW85GaultheriahumifusaSW70SanguisorbaofficinalisSW79RubusarcticusSW85EmpetrumnigrumSW70LeptarthenapyrolifoliaSW79PinuscontortaSW85DiscoursoxycoccosSW70EriophorumangustifoliumSW79PiceaspSW85PiceaspSW70EquisetumarvenseSW79LedumgreenlandicumSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85Parnassiafilm/riataSW71BetulananaSW79CarexaquatilisSW85ConuscanadensisSW71PinuscontortaSW79CarexaquatilisSW85Conuscanadensis	SW/70	Carev	limosa	SW/77	Saliv	harclavi		SW85	Rubus	arcticus				
SWT0CalifiaIndicase and lateralSWT1CalefaIndicataSW05LedulingroeinanticulinSWT0TrichophorumcespitosumSWT8EquisetumarvenseSW85GalltheriahumifusaSW70SanguisorbaofficinalisSW79RubusarcticusSW85EmpetrumnigrumSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccosSW70EriophorumangustifoliumSW79PiceaspSW85PiceaspSW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85ParnassiafimbriataSW71BetulananaSW79EmpetrumnigrumSW85EquisetumfluviatileSW71PinuscontortaSW79CarexaquatilisSW85Corruscanadensis	\$11/70	Caltha	lentosenala	SW/77	Carey	utriculata		SW85	Lodum	aroonlandicum				
SW10TheriophotomicCespicisumSW10EdusetumarverseSW05GaluteriafildmissaSW70SanguisorbaofficinalisSW79RubusarcticusSW85EmpetrumnigrumSW70LeptarrhenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccosSW70EriophorumangustifoliumSW79PiceaspSW85PiceaspSW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85ParnassiafimbriataSW71BetulananaSW79EmpetrumnigrumSW85EquisetumfluviatileSW71PinuscontortaSW79CarexaquatilisSW85Cornuscanadensis	SW/70	Triobonhor	appilosepaid	SW77	Equipotum	onvonoo		SW05	Coulthoric	humifuno				
SW10SanguisorbaOfficinalisSW19RubusarcticusSW85EmpetrumIngrumSW70LeptarthenapyrolifoliaSW79PinuscontortaSW85OxycoccusoxycoccusSW70EriophorumangustifoliumSW79PiceaspSW85PiceaspSW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85ParnassiafimbriataSW71BetulananaSW79EmpetrumnigrumSW85EquisetumfluviatileSW71PinuscontortaSW79CarexaquatilisSW85Comuscanadensis	500/0	n chopnorum	cespilosum	SVV/8	⊑quisetum	arvense		50005	Gaultheria	numitusa				
SW70LeptarrhenapyrolitoliaSW79PinuscontortaSW85OxycoccusoxycoccosSW70EriophorumangustifoliumSW79PiceaspSW85PiceaspSW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85ParnassiafimbriataSW71BetulananaSW79EmpetrumnigrumSW85EquisetumfluviatileSW71PinuscontortaSW79CarexaquatilisSW85Cornuscanadensis	SVV70	Sanguisorba	omcinalis	SW/9	Rubus	arcticus		59985	Empetrum	nıgrum				
SW70EriophorumangustifoliumSW79PiceaspSW85PiceaspSW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85ParnassiafimbriataSW71BetulananaSW79EmpetrumnigrumSW85EquisetumfluviatileSW71PinuscontortaSW79CarexaquatilisSW85Cornuscanadensis	SW70	Leptarrhena	pyrolifolia	SW79	Pinus	contorta		SW85	Oxycoccus	oxycoccos				
SW70EquisetumarvenseSW79LedumgroenlandicumSW85SanguisorbaofficinalisSW70PlatanthradilatataSW79BetulananaSW85ParnassiafimbriataSW71BetulananaSW79EmpetrumnigrumSW85EquisetumfluviatileSW71PinuscontortaSW79CarexaquatilisSW85Cornuscanadensis	SW70	Eriophorum	angustifolium	SW79	Picea	sp		SW85	Picea	sp				
SW70 Platanthra dilatata SW79 Betula nana SW85 Parnassia fimbriata SW71 Betula nana SW79 Empetrum nigrum SW85 Equisetum fluviatile SW71 Pinus contorta SW79 Carex aquatilis SW85 Cornus canadensis	SW70	Equisetum	arvense	SW79	Ledum	groenlandicum		SW85	Sanguisorba	officinalis				
SW71 Betula nana SW79 Empetrum nigrum SW85 Equisetum fluviatile SW71 Pinus contorta SW79 Carex aquatilis SW85 Cornus canadensis	SW70	Platanthra	dilatata	SW79	Betula	nana		SW85	Parnassia	fimbriata				
SW71 Pinus contorta SW79 Carex aquatilis SW85 Cornus canadensis	SW71	Betula	nana	SW79	Empetrum	nigrum		SW85	Equisetum	fluviatile				
	SW71	Pinus	contorta	SW79	Carex	aquatilis		SW85	Cornus	canadensis				

APPENDIX 3 – WETLAND ECOSYSTEM, FIELD DATA, CLASSIFICATION, AND AREA



Appendix 3
Wetland Ecosystem, Field Data, Classification, and Area

1 000 1 000	п	Plot	Date	Location	Fasting	Northing	Flevation	Aspect ⁰	Slone %	SMR	SNR	Von Post	Soil Water nH	Open Water nH
2 907. 17.3.4.4.4.7 Talling Opino C 97.457 807.4 4.2 4.5 No C - 7.2 7 5 807.0 17.3.4.4.4.7 Talling Opino C 97.457 807.0 87.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4	1	SW1	12-Jul-07	Tailings Option C	371118	6367321	908	192	<5	SI	В	3	7	6.8
3 9.5 15.2.4.4.47 Tating Opins C 57.400 827.47 88 9.2 1 9.1 8 - 7.2 7.2 0 80% 15.2.4.407 Tating Opins C 37.4408 808.202 87.7 18 6 8 C 5 7 7 0 80% 15.2.4.407 Tating Opins C 37.4408 808.200 86.7 18 8 C 5 7 7 7 0 80% 15.2.4.407 Tating Opins C 37.4408 88.8 -1 0 8 8 - 4.3.4 4.3.4 0 80% 14.4.407 Tating Opins C 37.478 827.82 88.1 -1 0 8 CD 6 5 5.8 C 6 5 5.8 C 6 5 5.8 C 6 5.7 5.8 118 897.14 14.4.4.4.4 Tating Opins A 387.69 5.7 5.8 5.8 </td <td>2</td> <td>SW2</td> <td>12-Jul-07</td> <td>Tailings Option C</td> <td>371257</td> <td>6367345</td> <td>891</td> <td>142</td> <td><5</td> <td>Mo</td> <td>c</td> <td>-</td> <td>7.2</td> <td>7</td>	2	SW2	12-Jul-07	Tailings Option C	371257	6367345	891	142	<5	Mo	c	-	7.2	7
4 5.8.4 7.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	3	SW3	12-Jul-07	Tailings Option C	371400	6367437	898	92	1	SI	В	-	7.2	7.2
6 6.878 9.3.4.07 1 ming Comin. C 977 ming Comin. C <	4	SW4	12-Jul-07	Tailings Option C	373824	6368122	847	140	<5	St	в	-	6.9	6.8
6 8 7 8 7 7 7 7 8 7 8 7 7 7 9 90 90 90 90<	5	SW5	12-Jul-07	Tailings Option C	373961	6368207	847	-1	0	St	c	-	6.5	6.9
7 8 8 0 5 7 7 8 807 15.467 1816 658 18 4 5 5 10 8070 15.467 1816 620 37 63 5 10 8071 15.467 1816 620 37 687 88 8 8 6 63 53 110 8071 15.467 1816 6200 37766 637763 88 1 0 8 8 0 6 63 63 110 8071 14.467 1816 6200 37766 637783 637 76 0 8 8 0 6 63 77 76 110 8777 14.467 1816 6200 37700 630 77 76 2 8 8 0 6 6 6 6 6 6 6 6 6 6 6	6	SW6	12-Jul-07	Tailings Option C	374045	6368240	857	165	<5	SI	C	5	7	7
8 8 9 1 1 1 1 1 1 5 5 5 1 8 1 1 0 8 8 9 0 5 5 1 8 1 1 0 8 8 0 4 5 5 1 8 1 1 0 8 8 0 5 5 5 1 8 1 3 0 1 0 8 0 0 5 5 5 5 1 8 1 3 3 1 0 8 0 5 <t< td=""><td>7</td><td>SW7</td><td>12-Jul-07</td><td>Tailings Option C</td><td>374095</td><td>6368290</td><td>854</td><td>165</td><td><5</td><td>SI</td><td>C</td><td>5</td><td>7</td><td>7</td></t<>	7	SW7	12-Jul-07	Tailings Option C	374095	6368290	854	165	<5	SI	C	5	7	7
9 9 3-ubd? Taing Opion C 37711 628738 912 -1 0 81 B - 4.8 5.2 10 8970 31.ubd? Taing Opion C 37711 628738 81 - 0 8 B - 6 7 6 7 6 7 6 7 6	8	SW8	13-Jul-07	Tailings Option C	371596	6367247	896	334	<5	SI	В		5.6	5.5
10 Shuld 7 Tailing Cance C 337266 Biol 2017 Gall Ba - 6.3 6.3 10 SV11 Su1407 Tailing Cance C 337266 SU1415 880 -1 0 SU CD 6 - - - - 10 SV13 14-Jul 7 Tailing Cance A 381766 SU73720 753 -1 0 SU C 5 6.1 6.3 10 SV14 4-Jul 7 Tailing Cance A 381768 SU73720 760 - 1 0 SU C - 6.4 6.4 6.4 10 SV14 4-Jul 7 Tailing Cance A 38168 GU7382 802 -2 SU C - 6.4	9	SW9	13-Jul-07	Tailings Option C	371960	6367318	912	-1	0	St	В	-	4.8	5.2
11 5-44-77 Tailing Oxion C 37260 527270 5272	10	SW10	13-Jul-07	Tailings Option C	372711	6367364	869	320	<5	SI	В		6.3	6.3
12 SYN2 15-Julo7 Tailing Option C 37280 638770 23 30 -5 SI C 6 6.7 5.8 14 SYN3 14-Julo7 Taingo Option A 38770 6.37 7.6 1 0 SI C 5 6.1 6.1 6.1 14 SYN3 14-Julo7 Taingo Option A 38780 6.37100 7.6 1 0 SI C 3 7.6 7.6 15 SYN3 14-Julo7 Taingo Option A 38780 6.37188 6.3 1 0 SI C 6.4 6.4 6.7 16 SYN3 14-Julo7 Taingo Option A 38182 6.37388 6.0 31 0 SI C - 6.4 6.7 7.4 17 SYN3 14-Julo7 Taingo Option A 38182 6.37388 6.0 31 0 SI SI C - - - - - - - - - - - - - - <td< td=""><td>11</td><td>SW11</td><td>13-Jul-07</td><td>Tailings Option C</td><td>372696</td><td>6367415</td><td>880</td><td>-1</td><td>0</td><td>SI</td><td>C/D</td><td>4</td><td>5.4</td><td></td></td<>	11	SW11	13-Jul-07	Tailings Option C	372696	6367415	880	-1	0	SI	C/D	4	5.4	
13 8/13 14-JA07 Taining Captern A 381768 627 63 SL C 6 6.7 6.8 15 8/17 6.1.8 381768 6173202 63 1 0 8 C 5 6.1.8 6.3 7.3 16 8/17 14.JA07 Tailing Captern A 381768 6173202 7.8 1 0 81 C 6.5 7.1 17 8/17 Tailing Captern A 381758 617338 623 7.8 2 81 C 6.5 7.1 18 8/17 14.JA07 Tailing Captern A 381692 617338 623 7.8 2 81 C 6.5 7.1 18 8/17 Tailing Captern A 381692 617328 800 1.1 0 81 C 6.5 7.1 18 8/17 Tailing Captern A 38231 617328 800 1.1 0 81 C 1.1 <td>12</td> <td>SW12</td> <td>13-Jul-07</td> <td>Tailings Option C</td> <td>372606</td> <td>6367523</td> <td>881</td> <td>-1</td> <td>0</td> <td>SI</td> <td>в</td> <td>-</td> <td>-</td> <td>-</td>	12	SW12	13-Jul-07	Tailings Option C	372606	6367523	881	-1	0	SI	в	-	-	-
14 91/4 14-JuAy Taining Chern A 81780 67720 785 -1 0 Sit C 5 6.7 6.7 15 801/1 14-JuAy Taining Chern A 38180 6372072 600 -1 0 Sit C 0 6.4 6.4 6.4 000 81101 41-JuAy Taining Chern A 381802 C37308 000 1 0 Sit C 6.4 6.5 6.5 6.1 20 81730 41-JuAy 71 0 Sit C 6.4 6.4 6.5 6.5 6.1 20 81730 81602 637324 802 1 0 Sit BC 6.1 6.3 6.7 7.8 20 81730 637324 802 610 1	13	SW13	14-Jul-07	Tailings Option C	374278	6367703	923	320	<5	SI	С	6	5.7	5.8
15 SW15 14-July 7 Taining Cyttom A 381888 6372007 600 -1 0 SI BC 3 6.8 7.0 16 SW16 14-July 7 Taining Cyttom A 381882 6372000 000 -1 0 SI C -7 6.4 6.7 17 SW16 14-July 7 Taining Cyttom A 381882 6373835 807 -1 0 SI C -7 6.4 6.6 20 SW20 14-July 7 Taining Cyttom A 381886 6373335 807 -1 0 SI C 6.5 6.6 6.7 21 SW21 15-July 7 Taining Cyttom A 381805 637334 805 -1 0 SI C 6.5 6.5 6.6 22 SW23 15-July 7 Taining Cyttom A 381616 6374232 805 -1 0 SI BC 2 7.1 7.4 23 SW23 15-July 7 Taining Cyttom A 38214 637203 802 10 SI <	14	SW14	14-Jul-07	Tailings Option A	381756	6373020	785	-1	0	SI	С	5	6.1	6.3
16 Sh/16 14-July 7 Taingo Chem A 381786 637300 803 -1 0 St C - 7.3 7.6 16 SN178 14-July 7 Taingo Chem A 381786 6373191 7.6 51 0 51 0 6.9 6.9 16 SN178 14-July 7 Taingo Chem A 38180 6373191 7.6 51 0 51 0 6.9 6.6 6.6 6.6 21 SN21 15-July 7 Taingo Chem A 38160 637328 607 7.8 81 C - 6.9 7.1 23 SN23 15-July 7 Taingo Chem A 38160 637328 620 -1 0 N6 C - 7.1 23 SN23 15-July 7 Taingo Chem A 38241 6372317 642 -1 0 N8 C - 7.1 7.3 24 SN26 15-July 7 Taingo Chem A 38241 6372317 642 -1 0 N8 C - 7.1	15	SW15	14-Jul-07	Tailings Option A	381889	6372972	809	-1	0	SI	B/C	3	6.8	7.9
11 SW17 14-July 7 Talings Option A 38188 637391 706 -1 0 St. C - 6.9 7.1 19 SW18 14-July 7 Talings Option A 38188 637383 802 300 2 St. B - 6.9 6.1 19 SW18 14-July 7 Talings Option A 38186 637381 806 1 0 St. C - 6.9 6.7 22 SW22 15-July 7 Talings Option A 38160 637321 806 -1 0 St. B - - - 7.1 23 SW23 15-July 7 Talings Option A 38161 637721 805 -1 0 St. B - - - 7.3 24 SW24 15-July 7 Talings Option A 382213 637191 848 -1 0 St. C 4 6.3 7.3 25 SW24 15-July 7 Talings Option A 382014 637144 842 -1	16	SW16	14-Jul-07	Tailings Option A	381993	6373009	803	-1	0	St	С	-	7.3	7.6
18 SW18 14-Jac/7 Talning Option A 381892 6373894 625 276 2 SR B - 6.4 6.5 20 SW10 14-Jac/7 Talning Option A 381696 6373895 800 10 0 S C - 6.6 6.6 21 SW20 14-Jac/7 Talning Option A 381690 6373895 800 1 0 S C - 6.6 6.6 23 SW20 15-Jac/7 Talning Option A 381402 637324 802 -1 0 S1 B - - 7.7 24 SW24 15-Jac/7 Talning Option A 382214 6371227 8042 -1 0 S1 B - - 7.7 7.3 25 SW25 15-Jac/7 Talning Option A 382214 637192 843 -1 0 S1 BC 4 6.3 6.7 7.5 26 SW28 15-Jac/7 Talning Option A 382146 63888 20 - <	17	SW17	14-Jul-07	Tailings Option A	381758	6373191	796	-1	0	St	С	-	6.9	7.1
19 14-Jack / 1 Tailing Option A 381686 673830 802 330 2 Si C - C1 7 21 SW20 15-Jack / 7 Tailing Option A 381690 6373321 600 60 61 0 51 C - 6.5 6.5 21 SW21 15-Jack / 7 Tailing Option A 381690 6374238 600 64 0 S1 C - - 7.3 24 SW24 15-Jack / 7 Tailing Option A 38151 637423 646 -1 0 S1 BC - 6.5 7.5 24 SW24 15-Jack / 7 Tailing Option A 382412 637147 846 -1 0 S1 BC 4 6.5 7.5 25 SW26 15-Jack / 7 Tailing Option A 382412 6371342 846 -1 0 S1 BC 4 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 <t< td=""><td>18</td><td>SW18</td><td>14-Jul-07</td><td>Tailings Option A</td><td>381892</td><td>6373684</td><td>825</td><td>276</td><td>2</td><td>St</td><td>В</td><td>-</td><td>6.4</td><td>6.9</td></t<>	18	SW18	14-Jul-07	Tailings Option A	381892	6373684	825	276	2	St	В	-	6.4	6.9
20 SW20 14-July7 Taining Option A 381685 677 -1 0 SI C - 6.5 6.5 21 SW20 15-July7 Taining Option A 381602 6373385 78 -1 0 SI C -	19	SW19	14-Jul-07	Tailings Option A	381686	6373830	802	330	2	SI	С	-	7.1	7
21 Siv21 15-Julo7 Taining Option A 381600 6873211 806 81 7 St C - 6.9 7.1 23 Siv23 15-Julo7 Taining Option A 381402 6373324 805 -1 0 Mo C - - - 24 Siv21 15-Julo7 Taining Option A 381402 6373214 802 -1 0 SI B -	20	SW20	14-Jul-07	Tailings Option A	381695	6373935	807	-1	0	SI	С	-	6.5	6.6
22 SV22 15-Jul 7 Tailing Option A 381602 6373365 789 -1 0 SI BC 4 - - 24 SV24 15-Jul 7 Tailing Option A 381561 6374229 B02 -1 0 SI B - - - 7.3 24 SV24 15-Jul 7 Tailing Option A 382513 6374229 B04 -1 0 SI C 4 6.5 7.3 27 SV27 15-Jul 7 Tailing Option A 382513 63711513 B43 -1 0 SI C 4 6.5 7.6 28 SV28 15-Jul 7 Tailing Option A 382513 6371143 843 -1 0 SI C 3 6.7 6.6 28 SV38 15-Jul 7 Tailing Option A 382514 6371847 838 1.4 0 SI C 3 6.7 7 38 SV38 15-Jul 7 Tailing Option A 381616 6374625 811 1 0 <td< td=""><td>21</td><td>SW21</td><td>15-Jul-07</td><td>Tailings Option A</td><td>381660</td><td>6373211</td><td>806</td><td>88</td><td>7</td><td>St</td><td>С</td><td>-</td><td>6.9</td><td>7.1</td></td<>	21	SW21	15-Jul-07	Tailings Option A	381660	6373211	806	88	7	St	С	-	6.9	7.1
23 SV/23 15-Jul-7 Tailings Option A 381402 6373524 605 -1 0 Mo C - - - - - - - - - - - - - - - - - 7.1 7.4 25 SV25 15-Jul-7 Tailings Option A 382214 6572218 844 -1 0 SI C - 6.6 7.3 28 SV25 16-Jul-7 Tailings Option A 382244 6371202 846 -1 0 SI C 3 6.7 6.6 30 SV30 16-Jul-7 Tailings Option A 38204 6371407 532 20 -2 SI B -	22	SW22	15-Jul-07	Tailings Option A	381502	6373385	789	-1	0	SI	B/C	4	-	7.1
24 SN24 15-Julo7 Taings Option A 38151 6374229 902 -1 0 Si B - -7.1 7.3 28 SN26 15-Julo7 Taings Option A 382412 6372017 842 -1 0 Si B - 6.7 7.8 28 SN276 15-Julo7 Taings Option A 382412 6371017 842 -1 0 Si B - 6.7 6.8 28 SN26 16-Julo7 Taings Option A 382171 637142 842 -1 0 Si C 3 6.7 6.8 28 SN36 16-Julo7 Taings Option A 381822 638385 881 14 0 Mo CD -	23	SW23	15-Jul-07	Tailings Option A	381402	6373524	805	-1	0	Mo	С	-	-	-
25 SW25 15-Julo7 Talings Option A 382:14 6372:18 646 -1 0 Si B - 6.7 7.4 27 SW27 15-Julo7 Talings Option A 382:13 637:1613 843 -1 0 Si B - 6.7 7.3 28 SW28 16-Julo7 Talings Option A 382:17 637:142 640 -1 0 Si BCC 4 6.8 7.3 29 SW28 16-Julo7 Talings Option A 382:17 637:342 640 -0 Si B -	24	SW24	15-Jul-07	Tailings Option A	381561	6374229	802	-1	0	SI	В	-	-	7.3
26 SW26 15-Julo7 Talings Option A 382412 6371037 842 -1 0 SI B - 6.7 7.8 28 SW28 16-Julo7 Talings Option A 382264 6371202 848 -1 0 SI BC 4 6.3 7.6 30 SW30 16-Julo7 Talings Option A 382044 6371437 6312 20 -5 SI -	25	SW25	15-Jul-07	Tailings Option A	382214	6372218	846	-1	0	SI	С	-	7.1	7.4
27 SW27 16-Jul07 Talings Option A 382513 6371613 843 -1 0 Si C 4 6.8 7.6 28 SW28 16-Jul07 Talings Option A 382171 6371942 842 -1 0 Si C 3 6.7 6.6 29 SW31 16-Jul07 Talings Option A 381622 6368865 881 104 2 Si B - - - 31 SW31 16-Jul07 Talings Option A 381624 6368865 861 -1 0 Si CD 3 6.2 6.6 33 SW35 16-Jul07 Talings Option A 381614 6368815 -1 0 Si CD 3 6.3 6.5 34 SW36 17-Jul07 Talings Option A 381618 6374625 601 -1 0 Si CD 5 6.3 6.5 38 SW36 17-Jul07 Talings Option A 38169 6374692 694 -1 0 Si CD	26	SW26	15-Jul-07	Tailings Option A	382412	6372037	842	-1	0	SI	В		6.7	7.8
28 SW28 16-Jub7 Talings Option A 382264 6371202 848 -1 0 Si B/C 4 6.3 7.6 30 SW30 16-Jub77 Talings Option A 382064 6371497 832 290 45 Si - </td <td>27</td> <td>SW27</td> <td>15-Jul-07</td> <td>Tailings Option A</td> <td>382513</td> <td>6371613</td> <td>843</td> <td>-1</td> <td>0</td> <td>SI</td> <td>С</td> <td>4</td> <td>6.8</td> <td>7.3</td>	27	SW27	15-Jul-07	Tailings Option A	382513	6371613	843	-1	0	SI	С	4	6.8	7.3
29 SW29 16-Jul-07 Tailings Option A 382114 6731447 842 21 0 St C 3 6.7 6.6 31 SW31 16-Jul-07 Tailings Option A 381024 6371497 832 20 St B1 -	28	SW28	16-Jul-07	Tailings Option A	382264	6371202	848	-1	0	SI	B/C	4	6.3	7.6
30 NV30 16-Julo7 Talings Option A 38204 637447 832 200 -5 SI 31 NV31 16-Julo7 Talings Option A 38122 638985 861 38 No CD 6 6.2 6.2 6.2 32 NV34 16-Julo7 Talings Option A 38214 6388813 858 -1 0 No CC 3 6.2 6.2 6.2 34 NV34 16-Julo7 Talings Option A 38216 6388702 851 -1 0 No CC 4 7.1 35 NV35 17-Julo7 Talings Option A 38168 6374622 804 -1 0 No 6.3 6.5 6.2	29	SW29	16-Jul-07	Tailings Option A	382171	6371344	842	-1	0	St	С	3	6.7	6.6
31 SW31 15-U4-07 Taingo Cpuion A 381804 6388865 889 10-4 2 St B - 6.2 6.2 33 SW33 15-U4-07 Taingo Cpuion A 381804 6388857 869 3.4 0.4 0.5 C 3 6.2 6.6 34 SW43 15-U4-07 Taingo Cpuion A 382219 6388670 853 -1 0 SI C/D 3 6.7 7 35 SW35 15-U4-07 Taingo Cpuion A 381618 6374622 801 -1 0 SI C/D 5 6.3 6.7 37 SW37 17-U4-07 Taingo Cpuion A 381696 6374522 804 -1 0 SI B/C 4 - - 6.2 6.2 6.2 38 SW39 17-U4-07 Taingo Cpuion A 38107 6374532 844 -1 0 SI C/D 5 6.2 6.2 6.2 41 SW41 17-U4-07 Taingo Cpuion A 381091 6374592 <td>30</td> <td>SW30</td> <td>16-Jul-07</td> <td>Tailings Option A</td> <td>382064</td> <td>6371497</td> <td>832</td> <td>290</td> <td><5</td> <td>SI</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td>	30	SW30	16-Jul-07	Tailings Option A	382064	6371497	832	290	<5	SI	-	-	-	-
32 SW32 16-Jul-07 Tainings Option A 38194 636865 869 38 -5 Mo C/D 6 6.3 6.7 34 SW34 16-Jul-07 Tainings Option A 382014 6368670 853 -1 0 Mo C - - - 35 SW35 16-Jul-07 Tainings Option A 382140 6368670 851 -1 0 S1 C/D 3 6.7 7 36 SW36 17-Jul-07 Tainings Option A 38169 6374672 804 -1 0 S1 B/C 4 - - 6.3 6.5 38 SW38 17-Jul-07 Tainings Option A 381795 6374672 784 -1 0 Mo - - - 6.3 6.5 38 SW38 17-Jul-07 Tainings Option A 381057 6373148 862 -1 0 S1 B 4 6.6 6.6 6.6 414 SW40 17-Jul-07 Tainings Option A 381057 6373	31	SW31	16-Jul-07	Tailings Option A	381822	6368365	881	104	2	St	в	-	6.2	6.2
33 SW33 16-Jul-07 Tailings Option A 38214 6588670 853 -1 0 Mo C - - 35 SW35 16-Jul-07 Tailings Option A 38216 6588670 853 -1 0 SI C/D 3 6.7 7 36 SW36 17-Jul-07 Tailings Option A 38168 6374825 801 -1 0 SI C/D 5 6.7 7 37 SW37 17-Jul-07 Tailings Option A 38168 6374825 801 -1 0 SI B/C 4 -	32	SW32	16-Jul-07	Tailings Option A	381804	6368685	869	38	<5	Mo	C/D	6	6.3	6.7
34 SW34 16.Jub/07 Tailings Option A 38219 6368670 853 -1 0 Mo C/D 3 6.7 7 35 SW35 16.Jub/07 Tailings Option A 381618 6374922 851 -1 0 SI C/D 5 6.3 6.5 36 SW35 17.Jub/07 Tailings Option A 38159 6374592 78 -1 0 Mo - - - 6.3 37 SW37 17.Jub/07 Tailings Option A 381705 6374592 78 -1 0 Mo - - - 6.3 40 SW40 17.Jub/07 Tailings Option A 381297 6373492 78 -1 0 SI C/D 5 5.8 6.2 <td>33</td> <td>SW33</td> <td>16-Jul-07</td> <td>Tailings Option A</td> <td>382014</td> <td>6368813</td> <td>858</td> <td>-1</td> <td>0</td> <td>SI</td> <td>С</td> <td>3</td> <td>6.2</td> <td>6.6</td>	33	SW33	16-Jul-07	Tailings Option A	382014	6368813	858	-1	0	SI	С	3	6.2	6.6
35 SW35 16.1407 Tailings Option A 38161 638702 851 -1 0 SI C/D 3 6.7 7 37 SW33 17.41407 Tailings Option A 38168 6374872 801 -1 0 SI B/C 4 - 6.3 38 SW38 17.41407 Tailings Option A 381676 6374522 788 -1 0 Mo - - - 6.9 39 SW39 17.41407 Tailings Option A 38167 6374302 84 -1 0 SI C/D 5 6.2 6.2 41 SW41 17.41407 Tailings Option A 381901 6373022 84 -1 0 SI C 2 6.8 6.5 43 SW44 17.41407 Tailings Option A 38285 6374023 877 69 -5 SI B 4 6.6 6.8 6.8 6.8 6.8 6.8 44 SW44 17.4107 Tailings Option A 382925 6369848	34	SW34	16-Jul-07	Tailings Option A	382219	6368670	853	-1	0	Mo	С	-	-	-
36 SVV36 17.Jul-07 Tailings Option A 381616 6374825 801 -1 0 St C/D 5 6.3 6.5 38 SVV38 17.Jul-07 Tailings Option A 381705 6374592 798 -1 0 No - - - 6.9 38 SVV38 17.Jul-07 Tailings Option A 381297 6372881 - -1 0 St B/C 5 8.6 6.2 40 SVV40 17.Jul-07 Tailings Option A 381297 6372881 - -1 0 St C/C 2 6.8 6.5 41 SVV41 17.Jul-07 Tailings Option A 381802 6370933 877 69 <5	35	SW35	16-Jul-07	Tailings Option A	382160	6368702	851	-1	0	SI	C/D	3	6.7	7
37 SW37 17.Jul-07 Tailings Option A 381569 6374672 804 -1 0 St BC 4 7.1 38 SW38 17.Jul-07 Tailings Option A 381050 6373149 862 -1 0 St BC 5 5.8 6.2 39 SW43 17.Jul-07 Tailings Option A 381057 6373302 844 -1 0 St CD 5 6.2 6.2 6.2 41 SW44 17.Jul-07 Tailings Option A 381901 6370929 864 82 7 St B 4 6.6 6.8 43 SW44 17.Jul-07 Tailings Option A 381295 6369063 838 -1 0 St B 3 6.8 44 SW44 17.Jul-07 Tailings Option A 382295 6369063 833 -1 0 St B 3 6.8 45 SW44 17.Jul-07 Tailings Option A 382495 63690520 830 -1	36	SW36	17-Jul-07	Tailings Option A	381618	6374825	801	-1	0	St	C/D	5	6.3	6.5
38 SW38 17.Jul-07 Tailings Option A 381705 6374592 798 -1 0 Mo 6.2 40 SW40 17.Jul-07 Tailings Option A 381297 6372681 0 Dy </td <td>37</td> <td>SW37</td> <td>17-Jul-07</td> <td>Tailings Option A</td> <td>381569</td> <td>6374672</td> <td>804</td> <td>-1</td> <td>0</td> <td>St</td> <td>B/C</td> <td>4</td> <td>-</td> <td>7.1</td>	37	SW37	17-Jul-07	Tailings Option A	381569	6374672	804	-1	0	St	B/C	4	-	7.1
39 SW39 17.Jub/7 Tailings Option A 380/423 6373149 862 -1 0 Str BC 5 5.8 6.2 41 SW41 17.Jub/7 Tailings Option A 381057 6373302 844 - 1 0 St CD 5 6.2 6.2 42 SW43 17.Jub/7 Tailings Option A 381901 6370929 864 82 7 St B 4 6.6 6.8 43 SW43 17.Jub/7 Tailings Option A 381862 6370933 877 69 -5 St - 5 6.4 7.2 45 SW45 17.Jub/7 Tailings Option A 382270 6369448 833 -1 0 Mo C -	38	SW38	17-Jul-07	Tailings Option A	381705	6374592	798	-1	0	Mo	-	-	-	6.9
40 SW40 17 Jul-07 Tailings Option A 381297 6372681 - - 1 0 Dy - </td <td>39</td> <td>SW39</td> <td>17-Jul-07</td> <td>Tailings Option A</td> <td>380423</td> <td>6373149</td> <td>862</td> <td>-1</td> <td>0</td> <td>St</td> <td>B/C</td> <td>5</td> <td>5.8</td> <td>6.2</td>	39	SW39	17-Jul-07	Tailings Option A	380423	6373149	862	-1	0	St	B/C	5	5.8	6.2
41 SW41 17-Jul-07 Tailings Option A 381057 6373402 844 -1 0 SI C/D 5 6.2 6.2 6.2 42 SW43 17-Jul-07 Tailings Option A 381901 6379033 877 69 -5 SI - 5 6.6 6.5 44 SW44 17-Jul-07 Tailings Option A 381901 6379033 877 69 -5 SI - 5 6.4 7.2 45 SW45 17-Jul-07 Tailings Option A 382295 6369063 838 -1 0 Nd C -	40	SW40	17-Jul-07	Tailings Option A	381297	6372681	-	-1	0	Dy	-	-	-	-
42 SW42 17-Jul-07 Tailings Option A 382863 6371401 872 -1 0 St C 2 6.8 6.5 43 SW43 17-Jul-07 Tailings Option A 381901 6370929 864 82 7 St B 4 6.6 6.8 44 SW44 17-Jul-07 Tailings Option A 381295 6369063 838 -1 0 St B 3 6.8 45 SW45 17-Jul-07 Tailings Option A 382270 6369448 833 -1 0 St B 5 47 SW47 18-Jul-07 Tailings Option A 382246 6368720 836 -1 0 St B 3 6.5 6.9 50 SW50 18-Jul-07 Tailings Option A 382264 6368238 874 -1 0 St B 4 6.7 6.6 51 SW51 18-Jul-07 Tailings Option A 382069 6368023 873 -1 0 <td< td=""><td>41</td><td>SW41</td><td>17-Jul-07</td><td>Tailings Option A</td><td>381057</td><td>6373302</td><td>844</td><td>-1</td><td>0</td><td>SI</td><td>C/D</td><td>5</td><td>6.2</td><td>6.2</td></td<>	41	SW41	17-Jul-07	Tailings Option A	381057	6373302	844	-1	0	SI	C/D	5	6.2	6.2
43 SW43 17-Julo7 Tailings Option A 381901 6370933 864 82 7 St B 4 6.6 6.8 44 SW44 17-Julo7 Tailings Option A 381862 6370933 877 69 <5	42	SW42	17-Jul-07	Tailings Option A	382863	6371401	872	-1	0	St	С	2	6.8	6.5
44 SW44 17-Jul-07 Tailings Option A 381862 6379033 877 69 <5	43	SW43	17-Jul-07	Tailings Option A	381901	6370929	864	82	7	St	В	4	6.6	6.8
45 SW45 17-Jul-07 Tailings Option A 382295 6369063 838 -1 0 St B 3 - 6.8 46 SW46 17-Jul-07 Tailings Option A 382275 636948 833 -1 0 Mo C - - - 47 SW47 18-Jul-07 Tailings Option A 382435 6368687 850 -1 0 St B 5 - . 7.7 48 SW48 18-Jul-07 Tailings Option A 38246 6368738 874 -1 0 St B 3 6.5 6.9 50 SW50 18-Jul-07 Tailings Option A 38254 6367955 891 -1 0 St B 4 6.7 6.6 52 SW51 18-Jul-07 Tailings Option A 382069 6368049 877 -1 0 St A 1 5.7 5.9 54 SW54 18-Jul-07 Tailings Option A 382107 6367913 882 -1 0	44	SW44	17-Jul-07	Tailings Option A	381862	6370933	877	69	<5	SI	-	5	6.4	7.2
46 SW46 17-Jul-07 Tailings Option A 382270 6369448 833 -1 0 Mo C - 7.7 48 SW48 18-Jul-07 Tailings Option A 382347 6368180 880 -1 0 St B 3 6.5 6.9 50 SW50 18-Jul-07 Tailings Option A 38254 6367955 891 -1 0 Mo B 4 6.8 7.2 51 SW51 18-Jul-07 Tailings Option A 382676 6368023 873 -1 0 St B 4 6.8 7.2 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 5.9 </td <td>45</td> <td>SW45</td> <td>17-Jul-07</td> <td>Tailings Option A</td> <td>382295</td> <td>6369063</td> <td>838</td> <td>-1</td> <td>0</td> <td>St</td> <td>В</td> <td>3</td> <td>-</td> <td>6.8</td>	45	SW45	17-Jul-07	Tailings Option A	382295	6369063	838	-1	0	St	В	3	-	6.8
47 SW47 18-Jul-07 Tailings Option A 382435 6368687 850 -1 0 St B 5 - 7.7 48 SW48 18-Jul-07 Tailings Option A 382347 6368180 880 -1 0 St B 3 6.5 6.9 50 SW50 18-Jul-07 Tailings Option A 382346 6368238 874 -1 0 St B 3 6.5 6.9 51 SW51 18-Jul-07 Tailings Option A 382246 6368238 873 -1 0 St B 4 6.8 7.2 52 SW52 18-Jul-07 Tailings Option A 382205 6368023 873 -1 0 St B 4 6.7 6.6 53 SW53 18-Jul-07 Tailings Option A 38210 6367913 882 -1 0 St C 3 6.7 7.1 56 SW56 18-Jul-07 Tailings Option A 38236 636735 892 -1 0 S	46	SW46	17-Jul-07	Tailings Option A	382270	6369448	833	-1	0	Mo	С	-	-	-
48 SW48 18-Jul-07 Tailings Option A 382546 6568/20 836 -1 0 St B/C 2 7.2 7.1 49 SW49 18-Jul-07 Tailings Option A 382468 6368180 880 -1 0 St B 3 6.5 6.9 50 SW50 18-Jul-07 Tailings Option A 382554 6367955 891 -1 0 St B 4 6.8 7.2 52 SW52 18-Jul-07 Tailings Option A 382069 6368023 873 -1 0 St B 4 6.8 7.2 53 SW53 18-Jul-07 Tailings Option A 382069 6368049 877 -1 0 St B 4 6.7 6.6 54 SW54 18-Jul-07 Tailings Option A 382107 6367619 881 -1 0 St C 3 6.7 7.1 55 SW55 18-Jul-07 Tailings Option A 382396 6367335 892 -1 0	47	SW47	18-Jul-07	Tailings Option A	382435	6368687	850	-1	0	St	В	5	-	1.1
49 SW49 18-Jul-07 Tailings Option A 382447 6368180 880 -1 0 St B 3 6.5 6.9 50 SW50 18-Jul-07 Tailings Option A 382468 636238 874 -1 0 No B 4 6.8 7.2 52 SW52 18-Jul-07 Tailings Option A 382554 6368023 873 -1 0 St B 4 6.7 6.6 53 SW53 18-Jul-07 Tailings Option A 382100 6368049 877 -1 0 St A 1 5.7 5.9 54 SW54 18-Jul-07 Tailings Option A 382107 6367619 881 -1 0 St C 3 6.7 7.1 56 SW56 18-Jul-07 Tailings Option A 382328 6367337 882 -1 0 St C 6 5.9 6.7 57 SW57 18-Jul-07 Tailings Option A 382428 6367335 892 -1 0 <	48	SW48	18-Jul-07	Tailings Option A	382546	6368720	836	-1	0	St	B/C	2	7.2	7.1
50 SW50 18-Jul-07 Tailings Option A 382488 6368238 874 -1 0 St - 6.6 5.9 5.9 5.9 5.4 SW54 18-Jul-07 Tailings Option A 382107 6367913 882 -1 0 St C 3 6.7 7.1 5.6 SW55 18-Jul-07 Tailings Option A 382306 6367836 892 -1 0 St C 6 5.9 6.9 5.7 SW57 18-Jul-07 Tailings Option A 382432 6367317 888 -1 0 St B - 6.6 </td <td>49</td> <td>SW49</td> <td>18-Jul-07</td> <td>Tailings Option A</td> <td>382347</td> <td>6368180</td> <td>880</td> <td>-1</td> <td>0</td> <td>St</td> <td>в</td> <td>3</td> <td>6.5</td> <td>6.9</td>	49	SW49	18-Jul-07	Tailings Option A	382347	6368180	880	-1	0	St	в	3	6.5	6.9
51 SW51 18-Jul-07 Tailings Option A 382554 b36 b56 b55 891 -1 0 Mo B 4 6.3 7.2 52 SW52 18-Jul-07 Tailings Option A 382059 6368023 873 -1 0 St B 4 6.7 6.6 53 SW53 18-Jul-07 Tailings Option A 382107 6368023 873 -1 0 St A 1 5.7 5.9 54 SW54 18-Jul-07 Tailings Option A 382107 6367619 881 -1 0 - - 2 - 6.3 55 SW55 18-Jul-07 Tailings Option A 382396 6367366 892 -1 0 St C 6 5.9 6.9 57 SW57 18-Jul-07 Tailings Option A 382326 6367335 892 -1 0 St C 5 - 6.7 6.6 58 SW58 18-Jul-07 Tailings Option A 382432 6367355 892 -1	50	SW50	18-Jul-07	Tailings Option A	382468	6368238	874	-1	0	St	-	-	-	-
52 SW52 18-Jul-07 Tailings Option A 382/05 63690423 873 -1 0 St B 4 6.7 6.6 53 SW53 18-Jul-07 Tailings Option A 382/069 6369494 877 -1 0 St A 1 5.7 5.9 54 SW54 18-Jul-07 Tailings Option A 382/10 6367619 881 -1 0 St C 3 6.7 7.1 56 SW56 18-Jul-07 Tailings Option A 382328 6367836 892 -1 0 St C 6 5.9 6.9 57 SW57 18-Jul-07 Tailings Option A 382328 6367375 892 -1 0 St C 5 6.7 58 SW58 18-Jul-07 Tailings Option A 382432 6367355 892 -1 0 St B - 6.1 6.66 59 SW59 18-Jul-07 Tailings Option A 382432 6367462 <td< td=""><td>51</td><td>50051</td><td>18-Jul-07</td><td>Tailings Option A</td><td>382554</td><td>6367955</td><td>891</td><td>-1</td><td>0</td><td>IVIO</td><td>в</td><td>4</td><td>6.8</td><td>7.2</td></td<>	51	50051	18-Jul-07	Tailings Option A	382554	6367955	891	-1	0	IVIO	в	4	6.8	7.2
53SW3318-Jul-07Tailings Option A382/106380499637/1-10StA15.75.954SW5418-Jul-07Tailings Option A382/106367913882-102-6.355SW5518-Jul-07Tailings Option A3821076367619881-10StC65.96.956SW5618-Jul-07Tailings Option A382328636736892-10StC65.96.957SW5718-Jul-07Tailings Option A3823286367317888-10StC65.96.758SW5818-Jul-07Tailings Option A3824326367317888-10StB-6.16.659SW5918-Jul-07Tailings Option A3824326367462881182<5	52	50052	18-Jul-07	Tailings Option A	382705	6368023	873	-1	0	St	в	4	6.7	6.6
54 SW54 18-Jul-07 Tailings Option A 382107 6367619 882 -1 0 - - 2 - 6.3 55 SW55 18-Jul-07 Tailings Option A 382107 6367619 881 -1 0 St C 3 6.7 7.1 56 SW56 18-Jul-07 Tailings Option A 382396 6367336 892 -1 0 St C 6 5.9 6.9 57 SW57 18-Jul-07 Tailings Option A 382326 6367317 888 -1 0 St C 5 - 6.7 58 SW58 18-Jul-07 Tailings Option A 382432 6367335 892 -1 0 St B - 6.1 6.6 59 SW59 18-Jul-07 Tailings Option A 382432 6367452 881 182 <5	53	50053	18-Jui-07	Tailings Option A	382069	6368049	877	-1	0	51	A	1	5.7	5.9
55 SW55 18-Jul-07 Tailings Option A 38210 ⁶ 6367619 881 -1 0 St C 3 6.7 7.1 56 SW56 18-Jul-07 Tailings Option A 382396 6367836 892 -1 0 St C 6 5.9 6.9 57 SW57 18-Jul-07 Tailings Option A 382328 6367317 888 -1 0 St C 5 - 6.7 58 SW58 18-Jul-07 Tailings Option A 382432 6367335 892 -1 0 St B - 6.1 6.6 59 SW59 18-Jul-07 Tailings Option A 382478 6367462 881 182 <5	54	50054	18-Jul-07	Tailings Option A	382110	6367913	882	-1	0	-	-	2	-	6.3
300 500 10-301-07 1000-07 <	55 56	SW55	18-JUI-07	Tailings Option A	382107	030/019	802	-1	U	51	C C	3	v./	1.1
57 58/07/ 16-Jul-07 Tailings Option A 382/32 636737 686 -1 0 51 C 5 - 6.7 58 SW58 18-Jul-07 Tailings Option A 382/32 6367353 892 -1 0 St B - 6.4 6.6 59 SW59 18-Jul-07 Tailings Option A 382/78 6367462 881 182 <5	50	SWSD	18-JUI-07	Tailings Option A	302390	030/030	09Z	-1	0	51		6	5.9	0.9
Stress Distribution Distribution <thdistribution< th=""> Distribution</thdistribution<>	57 59	SVV3/ SW/50	18-JUI-07	Tailings Option A	302320	6367335	000	-1	U	51		С	-	0.7
Swiss Instantings Uption A 362/176 0.507/402 061 182 <5 St A 2 6.4 6.9 60 SW60 19-Jul-07 Saddle 382681 6361925 951 19 <5	00 50	SWDO	18-JUI-07	Tailings Option A	382432	030/330	09Z	-1	0	51	в	-	0.1	0.0
Sweet 15-Jul-07 Saddle 382680 6361555 969 340 <5 SI B 3 6.3 6.8 61 SW61 19-Jul-07 Saddle 382680 6361585 969 340 <5	59 60	SW60	18-JUI-07	railings Option A	302110	6264025	00 I	182	<0	51	A	2	0.4	0.9
or word issuer Sadule	61	SWEI	19-JUI-07	Saddle	202001	6264595	901	19	<0	01	B	-	0.2	0.0
O2 O3002 O3	62	SWGD	19-Jul-07	Saddla	302000	6261224	909	340	<0	01		3	0.3	0.0
64 SW64 21-Jul-07 Saddle 382502 6360678 1001 350 10 St B - 6.6 7 65 SW65 21-Jul-07 Saddle 382711 6360578 1001 350 10 St B - 6.6 7	63	SW02	21-10107	Saddlo	382627	6360046	902 097	8	7	SI Mo	D/C	3	0.0	0.9
or over zrourov sadule 302,002 000000 1001 330 10 51 p - 0.0 7 65 SW65 21-Jul-07 Sadule 382711 6360540 994 20 St C 5 - 64	64	SWGJ	21-101-07	Saddla	382502	6360679	1001	350	10	01VIU C+	5	2	6.6	7
	65	SW65	21-Jul-07	Saddle	382711	6360540	994	330	20	St	C	5	-	64

(continued)

Appendix 3 Wetland Ecosystem, Field Data, Classification, and Area (continued)

	Blat	Data	Logotion	Easting	Northing	Floyetion	Acrost ⁰	Slone %	CMD	CNID	Von Boot	Soil Water nH	Onen Weter nH
	FIOL	Date	Location	Easting	Northing	Elevation	Aspeci	Slope %	SINK	SINK	VOILFOSL	Soli Water pri	Open water ph
66	50066	21-Jui-07	Saddle	383438	6359524	1037	-1	0	St	C	/	-	6.3
67	SW67	21-Jul-07	Saddle	383560	6359455	1025	134	<5	-	-	-	6.2	6
68	SW68	21-Jul-07	Saddle	383507	6360007	1049	278	10	St	В	8	-	5.6
69	SW69	21-Jul-07	Saddle	383655	6360009	1066	-1	0	-	-	-	-	-
70	SW70	21-Jul-07	Saddle	383409	6359984	1038	262	<5	SI	С	6	6	-
71	SW71	21-Jul-07	Saddle	383414	6360700	975	-1	0	St	Ċ	5	-	6.4
72	SW/72	21- Jul-07	Saddle	383055	6360302	08/	40	~5	51	B	5	_	6.1
72	SW72	21-501-07	Toilingo Option B	377345	6240028	1090	40	0		B	5	67	6.0
73	50073	22-Jui-07	Tailings Option B	377345	6349038	1089	-1	0	St - Dy	в	-	0.7	6.9
74	SW74	22-Jul-07	Tailings Option B	377712	6349670	1075	-1	0	St	С	-	-	7.4
75	SW75	22-Jul-07	Tailings Option B	377842	6349807	1091	-1	0	Mo	-	-	-	-
76	SW76	22-Jul-07	Tailings Option B	378176	6350622	1074	36	<5	SI	В	-	6.7	7.2
77	SW77	22-Jul-07	Tailings Option B	378144	6350551	1069	-1	0	Мо	-		-	-
78	SW/78	22- Jul-07	Tailings Option B	378980	6352372	1031	-1	0				_	
70	SW/70	22 001 07	Tailingo Option B	270522	6256507	052	120	-5	C+	Б	6	6.4	7 5
79	30079	22-Jul-07		370332	0300097	955	130	<0	31	D	0	0.4	7.5
80	50080	22-Jui-07	Tailings Option C	375301	6366961	803	-1	0	St	в	2	6.7	/
81	SW81	23-Jul-07	Tailings Option C	375918	6367949	763	-1	0	-	-	-	-	-
82	SW82	23-Jul-07	Saddle	380922	6359906	1168	-1	0	Mo	В	1	7.4	7.3
83	SW83	23-Jul-07	Pit Area	379721	6358579	937	-1	0	SI	В	1	7.4	7.4
84	SW84	23-Jul-07	Pit Area	379271	6359193	873	-1	0	Мо	в	1	77	77
95	SW/95	22 101 07	Pit Aroa	270250	6250620	0.0	1	0	<u>e</u> i	D		6.0	7
00	0000	23-30-07	Pit Alea	37 9330	0339020	-	-1	0	0	Б	4	0.9	'
80	50086	24-Jui-07	Road	384025	6362725		-		-	-		-	
87	SW87a	24-Jul-07	Road	384174	6362488	730	-1	0	Dy	В	2	6.8	7.1
88	SW87b	24-Jul-07	Road	384807	6361420	-	-1	0	Mo	В	2	7	6.7
89	SW88	24-Jul-07	Road	385427	6358774	-	-	-	-	-	-	-	-
90	SW89	24-Jul-07	Road	385645	6355224	-	-	-	-	-	-	-	-
01	S\W/90	24- Jul-07	Road	38/018	6351030	_	-1	0	Mo	в	1	7 1	77
02	SW01	24-501-07	Road	2045510	6250205		-1	0	WIO	D		7.1	1.1
92	30091	24-Jul-07	Road	304331	0350295	-	-	-	-	-	-	-	-
93	50092	24-Jui-07	Road	384216	6349803	-	-	-	-	-	-	-	-
94	SW93	24-Jul-07	Road	384962	6344494	-	-1	0	Mo	В	1	7	6.8
95	SW94	24-Jul-07	Road	382860	6332436	-	-	-	-	-	-	-	-
96	SW95	24-Jul-07	Road	382620	6332147	-	-1	0	SI	С	4	-	7.9
97	SW96	24-Jul-07	Road	382587	6331444	-	-1	0	SI	D	6	-	79
08	SW/97	2.00.07	Provisional Infrastructure Line100	383/17	6362332	_		-		-	-	_	-
90	30097	-	Fiovisional Initiastructure Line 100	303417	0302332	-	-	-	-	-	-	-	-
99	50098	-	AccessRoad 100	385406	6358126	-	-	-	-	-	-	-	-
100	SW99	-	AccessRoad 100	384998	6357761	-	-	-	-	-	-	-	-
101	SW100	-	AccessRoad 100	384923	6359837	-	-	-	-	-	-	-	-
102	SW101	-	AccessRoad 100	384934	6360403	-	-	-	-	-	-	-	-
103	SW102	-	AccessRoad 100	384603	6359085	-		-	-	-	-	-	-
104	SW/103		AccessRoad 100	384669	6360827	-						-	
104	SW103		Accessited 100	204054	6262020								
105	300104	-	AccessRoad 100	304034	0303039	-	-	-	-	-	-	-	-
106	SW105	-	AccessRoad 100	384638	6350861	-	-	-	-	-	-	-	-
107	SW106	-	AccessRoad 100	382543	6333330	-	-	-	-	-	-	-	-
108	SW107	-	AccessRoad 100	382580	6332307	-	-	-	-	-	-	-	-
109	SW108	-	AccessRoad 100	384326	6348307	-		-	-	-	-	-	-
110	SW109	-	AccessRoad 100	385080	6343793	-				-		-	-
111	SW/110	_	AccessRoad 100	402016	632/826	_	_	_	_	_	_	_	-
110	SW110	-	Accessited 100	402410	6224020	-	-	-	-	-	-	-	-
112	300111	-	AccessRoad 100	403410	0324914	-	-	-	-	-	-	-	-
113	SW112	-	AccessRoad 100	404528	6324776	-	-	-	-	-	-	-	-
114	SW113	-	AccessRoad 100	404550	6324893	-	-	-	-	-	-	-	-
115	SW114	-	AccessRoad 100	384416	6362206	-	-	-	-	-	-	-	-
116	SW115	-	Infrastructure 150m	383699	6362445	-		-	-	-	-	-	-
117	SW116		Infrastructure 150m	373202	6367282	-						-	
110	SW/117		Infrastructure 150m	272222	6267609								
110	300117	-		373322	0307000	-	-	-	-	-	-	-	-
119	SW118	-	Infrastructure 150m	375521	6369864	-	-	-	-	-	-	-	-
120	SW119	-	Infrastructure 150m	382261	6370908	-	-	-	-	-	-	-	-
121	SW120	-	Infrastructure 150m	380486	6373132	-	-	-	-	-	-	-	-
122	SW121	-	Infrastructure 150m	383280	6359444	-	-	-	-	-	-	-	-
123	SW122	-	Infrastructure 150m	379005	6359541	-	-	-	-	-	-	-	-
124	SW/123		Infrastructure 150m	382974	6359556	_	-	-	-	_	-	-	
124	SW123	-	Infrastructure 150m	201640	6274704	-	-	-	-	-	-	-	
120	SVV124	-	Infrastructure 150m	301040	03/1/01	-	-	-	-	-	-	-	-
126	500125	-	intrastructure 150m	3//4/1	6349188	-	-	-	-	-	-	-	-
127	SW126	-	Infrastructure 150m	378838	6351611	-	-	-	-	-	-	-	
128	SW127	-	Infrastructure 150m	378034	6349758	-	-	-	-	-	-	-	-
129	SW128	-	Infrastructure 150m	377918	6350169	-	-	-	-	-	-	-	-
130	SW129	-	Infrastructure 150m	372566	6367455	-	-	-	-	-	-	-	-
131	SW130	-	Infrastructure 150m	382521	6367461	-	-	-	-	-	-	-	
· • •													
Appendix 3 Wetland Ecosystem, Field Data, Classification, and Area (continued)

ID	Plot	Date	Location	Wetland Class_1	Assoc_Code_1	Wetland Class_2	Assoc_Code_2	Wetland Class_3	Assoc_Code_3	Area_ha	Area_M2	BECLABEL
1	SW1	12-Jul-07	Tailings Option C	Fen	Wf07	-	-	-	-	0.16	1639.50	ESSFwv
2	SW2	12-Jul-07	Tailings Option C	Swamp	Ws04	-	-	-	-	0.07	711.71	ESSFwv
3	SW3	12-Jul-07	Tailings Option C	Fen	Wf02	-	-	-	-	2.29	22890.99	ESSFwv
4	SW4	12-Jul-07	Tailings Option C	Fen	Wf02	-	-	-	-	0.15	1543.84	ESSFwv
5	SW5	12-Jul-07	Tailings Option C	Bog	Wb01	Fen	Wf02	-	-	0.48	4849.43	ESSFwv
6	SW6	12-Jul-07	Tailings Option C	Fen	Wf02	-	-	-	-	0.42	4150.76	ESSFwv
7	SW7	12-Jul-07	Tailings Option C	Fen	Wf02	Shallow Open Water		-	-	0.11	1107.00	ESSFwv
8	SW8	13-Jul-07	Tailings Option C	Bog	Wb02	-	-	-	-	0.09	906.12	ESSFwv
9	SW9	13-Jul-07	Tailings Option C	Bog	Wb02	Shallow Open Water		-	-	0.11	1121.58	ESSFwv
10	SW10	13-Jul-07	Tailings Option C	Fen	Wf02	Shallow Open Water		-	-	1.87	18745.50	ESSFwv
11	SW11	13-Jul-07	Tailings Option C	Shallow Open Water	Yellow Pond Lily	Fen	Wf01	Bog	Wb02	0.20	1962.45	ESSFwv
12	SW12	13-Jul-07	Tailings Option C	Fen	Wf04	Bog	-	-	-	0.49	4877.99	ESSFwv
13	SW13	14-Jul-07	Tailings Option C	Bog	Wb02	-	-	-	-	0.12	1156.29	ESSFwv
14	SW14	14-Jul-07	Tailings Option A	Fen	Wf02	Bog	Wb10	-	-	1.20	12025.70	ESSFwv
15	SW15	14-Jul-07	Tailings Option A	Fen	Wf02	-	-	-	-	0.60	6019.92	ESSFwv
16	SW16	14-Jul-07	Tailings Option A	Bog	Wb02	-	-	-	-	1.58	15752.50	ESSFwv
17	SW17	14-Jul-07	Tailings Option A	Fen	Wf02	Bog	Wb02	-	-	1.94	19357.79	ESSFwv
18	SW18	14-Jul-07	Tailings Option A	Bog	Wb07	Fen	Wf02	-	-	1.58	15773.00	ESSFwv
19	SW19	14-Jul-07	Tailings Option A	Bog	Wb05	Marsh	Wm01	-	-	4.03	40306.50	ESSFwv
20	SW20	14-Jul-07	Tailings Option A	Fen	Wf02	-	-	-	-	13.94	139398.30	ESSFwv
21	SW21	15-Jul-07	Tailings Option A	Bog	Wb07	-	-	-	-	0.89	8921.67	ESSFwv
22	SW22	15-Jul-07	Tailings Option A	Fen	Wf02	-	-	-	-	2.70	27014.64	ESSFwv
23	SW23	15-Jul-07	Tailings Option A	Fen	Wf02	-	-	-	-	5.65	56476.58	ESSFwv
24	SW24	15-Jul-07	Tailings Option A	Fen	Wf10	Fen	Wf02	Bog	Wb07	5.08	50791.10	ESSFwv
25	SW25	15-Jul-07	Tailings Option A	Bog	Wb05	-	-	-	-	0.51	5070.00	ESSFwv
26	SW26	15-Jul-07	Tailings Option A	Fen	Wf02	-	-	-	-	2.47	24726.00	ESSFwv
27	SW27	15-Jul-07	Tailings Option A	Fen	Wf02	-	-	-	•	5.27	52666.00	ESSFwv
28	SW28	16-Jul-07	Tailings Option A	Bog	Wb05	-	-	-	-	0.48	4810.00	ESSFwv
29	SW29	16-Jul-07	Tailings Option A	Bog	Wb05	-	-	-	•	0.12	1248.40	ESSFwv
30	SW30	16-Jul-07	Tailings Option A	Bog	Wb05	-	-	-	•	3.18	31844.50	ESSFwv
31	SW31	16-Jul-07	Tailings Option A	Fen	Wf04	-	-	-	-	1.10	10988.00	ESSFwv
32	SW32	16-Jul-07	Tailings Option A	Fen	Wf04		-	-	-	1.11	11142.50	ESSFwv
33	SW33	16-Jul-07	Tailings Option A	Fen	Wf07	Fen	Wf02	-	-	4.33	43287.00	ESSFwv
34	SW34	16-Jul-07	Tailings Option A	Shrub-Carr	Sc03	-	-	-	-	1.12	11150.50	ESSFwv
35	SW35	16-Jul-07	Tailings Option A	Fen	Wf04	-	-	-	-	4.33	43287.00	ESSFwv
36	SW36	17-Jul-07	Tailings Option A	Fen	Wf05	-	-	-	-	0.44	4398.60	ESSFwv
37	SW37	17-Jul-07	Tailings Option A	Fen	Wf05		-	-	-	0.39	3865.50	ESSFwv
38	SW38	17-Jul-07	Tailings Option A	Marsh	VVm01	Fen	VVf02	-	-	4.55	45469.23	ESSEWV
39	SW39	17-Jul-07	Tailings Option A	Fen	Wf10	-	-	-	-	1.08	10799.50	ESSFwv
40	SW40	17-Jul-07	Tailings Option A	Shallow Open Water	Yellow Pond Lily	-	-	-	-	1.43	14323.50	ESSEWV
41	SW41	17-Jul-07	Tailings Option A	Fen	Wt10	-	-	-	-	0.58	5792.00	ESSEWV
42	SW42	17-Jul-07	Tailings Option A	Marsh	VVm01	-	-	-	-	2.35	23480.00	ESSEwv
43	SVV43	17-Jul-07	Tailings Option A	Fen	VVf07	-	-	-	-	0.13	1327.57	ESSEWV
44	SVV44	17-Jul-07	Tailings Option A	Fen	Wf02	-	-	-	-	0.14	1392.22	ESSEWV
45	SVV45	17-Jul-07	Tailings Option A	Fen	VVf02	-	-	-	-	3.41	34139.00	ESSEWV
40	SVV40	17-Jul-07	Tailings Option A	Marsh	WINU I	- Challess Onen Water	- Dand Wand	-	-	0.57	00002.01	ESSEWV
47	SVV47	18-Jul-07	Tailings Option A	Fen	WIUZ	Shallow Open water	Pond weed	-	-	0.67	6708.50	ESSFWV
40	SVV40	10-Jul-07		Fen	W108	- Challess Onen Water	- Valley: Dand Like	-	-	0.07	6743.00	ESSEWV
49	SW49	18-Jul-07	Tailings Option A	Fen Shallow Open Water	WIU7 Vellow Dond Lilv	Shallow Open water	Yellow Pond Lily	-	-	1.02	10228.50	ESSFWV
50	SWSU	10-Jul-07	Tailings Option A	Shallow Open Water	Mito2	Fell	VVI07	-	-	0.37	3732.00	ESSEW
51	SWDT	10-Jul-07	Tailings Option A	Fen	W102	-	-	-	-	0.37	11000 50	ESSEW
52	SW52	10-Jul-07	Tailings Option A	Pell	WI02	- Fon	- W/f04	-	-	0.61	6121 50	ESSEWA
55	SW55	10-Jul-07	Tailings Option A	Bog	WD13	ren	W104	-	-	0.01	26624.00	ESSEW
54	SW34	10-Jul-07	Tailings Option A	Fen	W104	-	-	-	-	3.00	36624.00	ESSEW
55	SWSS	10-Jul-07	Tailings Option A	Fen	W104	-	-	-	-	3.00	50024.00	ESSEW
50	SW30 SW67	10-Jul-07	Tailings Option A	Fell	WI07 W#10	- Fon	- \\//f02	-	-	0.55	4208.00	ESSEWA
58	SW57	18- Jul-07	Tailings Option A	Fen	VVI I U \\//f13	Fen	WIUZ	-	-	0.43	2656.08	ESSEWA
50	SW50	19 10 07	Tailings Option A	Fon	W/10		VVIIO	-	-	0.27	2000.90	ESSEW
59	SW60	10-Jul-07	Saddla	Fen	WITO A	- Shallow Open Water	- Vollow Pond Liby	-	-	0.00	0002.00 27944 0F	ESSEW
61	SWOU	10-10/	Saddla	Fop	VVIU4 \\/f02	Shallow Open Water	Vellow Pond Lily	-	-	2.70	15065 55	ESSEW
62	SW62	19-101-07	Saddle	Fen	W/fO/	Shanow Open water		-	-	0.02	9151 04	ESSEWA
63	SW62	21-10-07	Saddle	Fen	WI04	-	-	-	-	3.61	36144 50	ESSEW
64	SWIEA	21-Jul-07	Saddle	Fon	W/fOA	-	-	-	-	3.01	31716.00	ESSEMA
65	SW65	21-Jul-07	Saddle	Fen	Wf12	Shallow Open Water	Yellow Pond Lilv	-	-	9.44	94385.05	ESSEWV
30	51100	2.00107	Odddio	1.011	11112	Shallow Open Water	. Show I ond Eily			0.77	3-000.00	

(continued)

Appendix 3 Wetland Ecosystem, Field Data, Classification, and Area (completed)

ID	Plot	Date	Location	Wetland Class 1	Assoc Code 1	Wetland Class 2	Assoc Code 2	Wetland Class 3	Assoc Code 3	Area ha	Area M2	BECLABEL
66	SW66	21- Jul-07	Saddle	Een	Wf08	Shallow Open Water	Yellow Pond Lily	-	-	4 93	49275 50	ESSEwv
67	SW67	21-Jul-07	Saddle	Fen	Wf04			_	_	0.73	7329 50	ESSEWN
69	SW69	21-Jul 07	Saddle	Fon	W104	-	-	-	-	0.73	2171 50	ESSENN
00	5000	21-Jul-07	Saddle	Challery Onen Water	VVIIZ	-	14/64 0	-	-	0.32	4742.50	ECOF
69	50069	21-Jul-07	Saddle	Shallow Open water	Yellow Pond Lily	Fen	VVT12	-	-	0.17	1743.50	ESSEWV
70	SW70	21-Jul-07	Saddle	Fen	VVf12		-	-	-	0.52	5180.00	ESSEWV
71	SW71	21-Jul-07	Saddle	Fen	Wf12	Fen	Wf02	-	-	4.53	45282.45	ESSFwv
72	SW72	21-Jul-07	Saddle	Fen	Wf12	Fen	Wf04	-	-	8.07	80676.00	ESSFwv
73	SW73	22-Jul-07	Tailings Option B	Swamp	Ws06	Flood	-	-	-	0.14	1445.50	ESSFwv
74	SW74	22-Jul-07	Tailings Option B	Swamp	Ws06	Flood	-	-	-	0.44	4446.50	ESSFwv
75	SW75	22-Jul-07	Tailings Option B	Marsh	Wm01	Shallow Open Water	-	-	-	0.22	2186.00	ESSFwv
76	SW76	22-Jul-07	Tailings Option B	Fen	Wf01	Fen	Wf04	-	-	3.55	35507.00	ESSEwv
77	SW/77	22- Jul-07	Tailings Option B	Marsh	Wm01	-	-	-	-	0.43	4309.00	ESSEWV
79	S\//79	22-Jul 07	Tailings Option B	Shallow Open Water	Horsotail					0.43	2207.50	ESSENN
70	3070	22-Jul-07	Tailings Option B	Shallow Open water	1 IOI SELAII	-	-	-	-	0.55	3297.30	LOOF
79	50079	22-Jui-07	Tailings Option B	Fen	VVI13	Shallow Open Water	Pond Weed	-	-	1.50	14952.95	ESSEWV
80	SW80	22-Jul-07	Tailings Option C	Fen	VVf08		-	-	-	1.00	9998.50	ESSEWV
81	SW81	23-Jul-07	Tailings Option C	Marsh	Wm01	Shallow Open Water	Horsetail	-	-	4.06	40576.50	ESSFwv
82	SW82	23-Jul-07	Saddle	Fen	Wf04	-	-	-	-	3.67	36721.00	ESSFwv
83	SW83	23-Jul-07	Pit Area	Marsh	Wm01	Fen	Wf04	-	-	8.32	83212.50	ESSFwv
84	SW84	23-Jul-07	Pit Area	Fen	Wf01	Fen	Wf04	-	-	3.27	32707.50	ESSFwv
85	SW85	23-Jul-07	Pit Area	Fen	Wf02	-	-	-	-	1.93	19295 00	ESSEwv
86	SW/86	24- Jul-07	Road	Fen	Fen*	-	-	-	-	112.87	1128709 48	ESSEwv
00	SW00	24-501-07	Road	Marah	Mm01					14.00	140974.01	ESSEW
07	SW07a	24-Jul-07	Road	Marsh	WINO 1	-	-	-	-	14.09	140674.01	ESSEWV
88	SVV87D	24-Jul-07	Road	Marsh	VVm01		-	-	-	60.61	606057.00	ESSEWV
89	SW88	24-Jul-07	Road	Swamp	Swmap*	Flood	-	-	-	6.32	63173.00	ESSFwv
90	SW89	24-Jul-07	Road	Bog	Bog*	-	-	-	-	0.51	5098.53	ESSFwv
91	SW90	24-Jul-07	Road	Marsh	Wm01	Shallow Open Water	-	-	-	19.53	195319.77	ESSFwv
92	SW91	24-Jul-07	Road	Flood	Flood	-	-	-	-	5.43	54265.00	ESSFwv
93	SW92	24-Jul-07	Road	Marsh	Marsh*	Swamp	-	Flood	-	0.06	575.76	ESSFwv
94	SW93	24-Jul-07	Road	Marsh	Wm01	<u> </u>	-	-	-	0.11	1076 11	ESSEwv
95	SW/94	24- Jul-07	Road	Fen	Fen*	-	-	-	-	0.99	9919 50	ESSEwv
06	SW05	24 Jul 07	Read	Fon	Wf04					2 70	26082.00	ESSENN
90	SW95	24-Jul-07	Road	T en	10/10/4	-	-	-	-	2.70	20903.00	ECOF
97	50096	24-Jui-07	Road	Fen	VVI04	-	-	-	-	0.48	4829.00	ESSEWV
98	SW97	-	Provisional Infrastructure Line100	I RIM Shallow Open Water	-	-	-	-	-	0.18	1844.00	ESSEwv
99	SW98	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	5.75	57527.00	ESSFwv
100	SW99	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	48.94	489362.50	ESSFwv
101	SW100	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	0.50	5043.50	ESSFwv
102	SW101	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	0.90	9043.00	ESSFwv
103	SW102	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	208.00	2080034.50	ESSFwv
104	SW103	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	36.53	365348 52	ESSEwv
105	SW104	-	AccessRoad 100	TRIM Swamp	_	-	-	-	-	54.85	548549.00	ESSEwv
106	SW/105		AccessRead 100	TRIM Shallow Open Water						0.00	994 00	ESSENN
100	SW/105	-	Accessitoad 100	TRIM Shallow Open Water	-	-	-	-	-	0.03	2100.00	ESSEW
107	SW100	-	AccessRoad 100	TRIM Shallow Open Water	-	-	-	-	-	0.21	2109.00	ESSEWV
108	500107	-	AccessRoad 100	TRIM Shallow Open Water	-	-	-	-	-	0.17	1731.50	ESSFWV
109	SW108	-	AccessRoad 100	I RIM Marsh	-	-	-	-	-	15.64	156381.50	ESSEWV
110	SW109	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	3.76	37588.00	ESSFwv
111	SW110	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	37.95	379509.00	ICH wc
112	SW111	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	25.02	250195.00	ICH wc
113	SW112	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	1.94	19387.00	ICH wc
114	SW113	-	AccessRoad 100	TRIM Marsh	-	-	-	-	-	2.68	26795.00	ICH wc
115	SW114	-	AccessRoad 100	TRIM Swamp	-	-	-	-	-	0.80	8022.50	ESSFwv
116	SW115	-	Infrastructure 150m	TRIM Shallow Open Water	_	-	-		-	0.49	4947 00	ESSEWV
117	SW/116		Infrastructure 150m	TRIM Shallow Open Water						0.40	000 50	ESSENN
110	SW110	-	Infrastructure 150m	TRIM Shallow Open Water	-	-	-	-	-	0.09	505.30	ESSEW
110	300117	-	Innastructure 150m	TRIM Shallow Open Water	-	-	-	-	-	0.07	001.00	ESSEWV
119	500118	-	Infrastructure 150m	TRIM Shallow Open Water	-	-	-	-	-	0.25	2503.00	ESSEWV
120	SW119	-	Infrastructure 150m	TRIM Shallow Open Water	-	-	-	-	-	0.20	1982.50	ESSFwv
121	SW120	-	Infrastructure 150m	TRIM Shallow Open Water	-	-	-	-	-	0.03	332.00	ESSFwv
122	SW121	-	Infrastructure 150m	TRIM Swamp	-	-	-	-	-	0.51	5051.00	ESSFwv
123	SW122	-	Infrastructure 150m	TRIM Swamp	-	-	-	-	-	1.12	11195.50	ESSFwv
124	SW123	-	Infrastructure 150m	TRIM Swamp	-	-	-	-	-	1.58	15836.00	ESSFwv
125	SW124	-	Infrastructure 150m	TRIM Swamp	-	-	-	-		0.85	8497.50	ESSFwv
126	SW125	-	Infrastructure 150m	TRIM Marsh	-	-	-	-	-	0.14	1434.00	ESSFwv
127	SW126	_	Infrastructure 150m	TRIM Marsh	_	-	-	-	-	0.14	1627.00	ESSEWV
120	CIN/127	-	Infractructure 150m		-	2	-	2	-	0.10	6726.00	ESSEW
120	GW 127	-			-	-	-	-	-	0.07	0120.00	LOOFWV
129	SVV128	-	Intrastructure 150m	I KIIVI Swamp	-	-	-	-	-	2.57	25650.50	ESSEWV
130	SW129	-	Infrastructure 150m	I KIM Shallow Open Water	-	-	-	-	-	0.09	905.50	ESSFwv
131	SW130	-	Infrastructure 150m	TRIM Marsh	-	-	-	-	-	0.28	2798.50	ESSFwv