TABLES

TABLE 1
SASKATCHEWAN AMBIENT AIR QUALITY STANDARDS

Pollutant	Average Concentration For Applicable Time Period [1]				
	1 Hour	8 Hours	24 Hours	30 Days	Annual
Suspended Pariculates			120 ug/m^3		70 ug/m^3
Settleable Particulates				2.0 mg/cm^2	
Soil Index			1.5 COH units		
Sulphur Dioxide	450 ug/m^3 (0.17)		150 ug/m^3 (0.06)		30 ug/m^3 (0.01)
Sulphation				30 mg of SO_3 per 100 cm^2	
Carbon Monoxide	15 mg/m^3 (13)	6 mg/m^3 (5)			
Oxidants (Ozone)	160 ug/m^3 (0.08)				
Nitrogen Dioxide	400 ug/m^3 (0.2)				100 ug/m^3 (0.05)
Hydrogen Sulphide	15 ug/m^3 (10.8)		5 ug/m^3 (3.6)		

Notes:
1 - Volume units in parts per million or parts per billion for hydrogen sulphide are in brackets
2 - 1 ug/m^3 = 0.001 mg/m^3
3 - COH units = Coefficient of Haze
Source - Air Monitoring Directive for Saskatchewan, Saskatchewan Environment 2007

TABLE 2
GENERAL GROUNDWATER QUALITY
CHORNEY BEACH, FISHING LAKE SASKATCHEWAN

Sample No.	Date	Parameter[1]															
		pH (units)	E.C. (µS/cm)	Alkalinity as $CaCO_3$	Bicarbonate as $CaCO_3$	Hardness as $CaCO_3$	Chloride	Fluoride	Sulphate	Nitrate (as N)	Calcium	Magnesium	Potassium	Sodium	Iron	Manganese	T.D.S.
EQL		*0.01*	*1*	*1*	*1*	*1*	*0.5*		*0.5*		*0.5*	*0.05*	*0.1*	*0.1*	*0.03*	*0.005*	*2*
2572	Oct-94	7.3	2410	338	412	707	35	0.63	1017	2	184	60	6	318	3.1	0.24	2028
3040	Aug-98	7.7	1930	410	500	334	38	-	603	2	76	35	-	343	1.1	0.04	1597
3093	Jun-00	7.3	1980	384	468	386	35	-	619	**11**	87	41	-	322	<0.1	0.09	1583
HC-CDWQ [3]																	
Drinking Water [2]		6.5 - 8.5 (AO)	-	-	-	200 [4] (AO)	250 (AO)	1.5 (MAC)	500 (AO)	10 (MAC)	-	-	-	200 (AO)	0.3 (AO)	0.05 (AO)	500 (AO)

Notes:

"-" = No Data

EQL = Estimated Quantitation Limit = The lowest level of the parameter that can be quantified with confidence

E.C. = Electrical Conductivity

T.D.S. = Total Dissolved Solids

1. All values are expressed in milligrams per litre (mg/L) unless indicated otherwise.
2. Guidelines for Canadian Drinking Quality, May 2008. Safe Environments Program, Health Canada, Federal-Provincial-Territorial Committee on Drinking Water.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objectives
3. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated May 2008.
4. Public acceptance of hardness varies considerably. Generally, hardness levels between 80 and 100 mg/L (as $CaCO_3$) are considered acceptable; levels greater than 200 mg/L are considered poor but can be tolerated; those in excess of 500 mg/L are normally considered unacceptable. Where water is softened by sodium ion exchange, it is recommended that a separate, unsoftened supply be retained for culinary and drinking water purposes.

BOLD	- Exceedance of Health Related Guidelines (MAC, IMAC)
Underlined	- Exceedance of Non-Health Related Guidelines (AO)

TABLE 3

PLANT SPECIES RECORDED WITHIN THE REGIONAL STUDY AREA

Common Name	Scientific Name	Provincial Status (S)	Growth Form	Number of plants recorded along transects May 30 - June 1, 2007		
				Transect 1	Transect 2	Transect 3
Trembling Aspen	Populus tremuloides	S5	Tree	5	14	4
Bracted Honeysuckle	Lonicera involucrata	S5	Shrub	--	8	--
Canada Buffaloberry	Shepherdia canadensis	S5	Shrub	4	--	--
Gooseberry	Ribes spp.	S5	Shrub	--	16	--
Red osier dogwood	Cornus sericea	S5	Shrub	4	8	2
Saskatoon	Amelanchier alnifolia	S5	Shrub	--	12	--
Silverberry	Elaeagnus commutata	S5	Shrub	12	7	8
Western Snowberry	Symphoricarpos occidentalis	S5	Shrub	5	21	20
Wild Red Raspberry	Rubus idaeus	S5	Shrub	2	18	4
Willow	Salix spp.	S5	Shrub	3	4	10
Wood's Rose	Rosa woodsii	S5	Shrub	9	24	12
Alkali Cord Grass	Spartina gracilis	SNR	Graminoid	--	--	--
Baltic Rush	Juncus balticus	S5	Graminoid	7	8	11
Bluegrass	Poa spp.	S5	Graminoid	7	20	--
Cattail	Typha latifolia	S5	Graminoid	--	--	--
Early blue grass	Poa cusickii	SNR	Graminoid	--	6	--
Fowl bluegrass	Poa palustris	S5	Graminoid	--	4	7
Kentucky Bluegrass	Poa pratensis	SNR	Graminoid	--	--	8
Mat Muhly	Muhlenbergia richardsonis	SNR	Graminoid	--	4	4
Northern Reed Grass	Calamagrostis stricta spp. inexpansa	SNR	Graminoid	--	10	1
Northern Wheatgrass	Elymus lanceolatus	SNR	Graminoid	--	--	--
Nuttall's Salt Grass	Puccinellia nuttalliana	SNR	Graminoid	--	--	1
Prairie Bulrush	Scirpus maritimus	S5	Graminoid	--	--	--
Quack grass	Elymus repens	S5	Graminoid	--	1	6
Salt Grass	Distichlis spicata var. stricta	S5	Graminoid	--	--	--
Seaside Arrow Grass	Triglochin maritima	S5	Graminoid	--	--	8
Sedge	Carex spp.	S5	Graminoid	6	9	15
Slender Wheatgrass	Elymus trachycaulus	S5	Graminoid	--	10	--
Smooth Brome	Bromus inermis	S5	Graminoid	2	12	6
Sweet Grass	Hierochloe spp.	S5	Graminoid	--	--	4
Water Sedge	Carex aquatilis	S5	Graminoid	--	--	--
White-grained Mountain Rice grass	Oryzopsis asperifolia	S5	Graminoid	3	20	--
Wild Barley	Hordeum jabatum	S5	Graminoid	--	--	2
Alfalfa	Medicago sativa	SNA	Forb	--	--	4

TABLE 3
PLANT SPECIES RECORDED WITHIN THE REGIONAL STUDY AREA

Common Name	Scientific Name	Provincial Status (S)	Growth Form	Number of plants recorded along transects May 30 - June 1, 2007		
				Transect 1	Transect 2	Transect 3
American Vetch	Vicia americana	S5	Forb	8	16	--
Aster spp.	Symphyotrichum spp.	S5	Forb	8	4	--
Bastard Toadflax	Comandra pallida	S5	Forb	4	8	8
Blue-eyed Grass	Sisyrinchium montanum	S5	Forb	--	--	4
Bunchberry	Cornus canadensis	S5	Forb	3	12	--
Buttercup	Ranunculus spp.	S5	Forb	--	--	--
Canada anemone	Anemone canadensis	S5	Forb	--	12	--
Canada Goldenrod	Solidago canadensis	S5	Forb	8	14	--
Canada Thistle	Cirsium arvense	SNA	Forb	--	4	--
Chickweed	Cerastium arvense	S5	Forb	--	8	--
Cinquefoil	Potentilla spp.	SNR	Forb	--	4	--
Clover	Trifolium spp.	SNA	Forb	--	4	--
Common Dandelion	Taraxacum officinale spp. officinale	SNA	Forb	4	40	15
Common Horsetail	Equisetum arvense	S5	Forb	--	4	--
Common Plantain	Plantago major	SNA	Forb	--	7	8
Common Ragweed	Ambrosia artemisiifolia	S5	Forb	--	8	--
Cream-colored Vetchling	Lathyrus ochroleucus	S5	Forb	--	4	--
Death Camas	ZIgadenus venenosus var. gramineus	SNR	Forb	--	--	4
Early blue violet	Viola adunca	S5	Forb	12	20	8
False Spikenard	Maianthemum racemosum spp. Amplexicaule	S1S2	Forb	--	4	4
Field Sow Thistle	Sonchus arvensis	SNA	Forb	--	8	--
Golden Bean	Thermopsis rhombifolia	S5	Forb	--	8	4
Goosefoot spp.	Chenopodium spp.	S5	Forb	--	--	8
Heart-leaved Alexander	Zizia aptera	S5	Forb	--	--	8
Milk Vetch	Astragalus spp.	S5	Forb	--	4	--
Milkwort	Glaux maritima	S5	Forb	--	4	8
Northern Bedstraw	Galium boreale	S5	Forb	--	3	8
Palmate-leaved Colt's-foot	Petasites frigidus var. palmatus	S5	Forb	--	--	4
Poison Ivy	Toxicodendron rydbergii	S5	Forb	3	12	--
Pussytoes	Antennaria paruifolia	S5	Forb	--	3	4
Red Swampfire	Salicornia rubra	S5	Forb	--	--	--
Saline Shooting Star	Dodecatheon pulchellum	S5	Forb	--	4	4
Saltwater Cress	Arabidopsis salsuginea	S5	Forb	--	--	--
Silverweed	Argentina anserina	S5	Forb	4	--	8

TABLE 3
PLANT SPECIES RECORDED WITHIN THE REGIONAL STUDY AREA

Common Name	Scientific Name	Provincial Status (S)	Growth Form	Number of plants recorded along transects May 30 - June 1, 2007		
				Transect 1	Transect 2	Transect 3
Smooth Wild Strawberry	Fragaria Virginiana ssp. Glauca	S5	Forb	4	5	--
Star-flowered Solomon's Seal	Smilacina stellata	S5	Forb	4	16	--
Sunflower	Helianthus spp.	S5	Forb	--	--	4
Sweet-scented Bedstraw	Galium triflorum	S5	Forb	7	20	--
Veiny Meadow Rue	Thalictrum venalosum	S5	Forb	8	20	4
Western Red Lily	Lilium philadelphicum var. andinum	S3S4	Forb	*	*	--
Yarrow	Achillea millefolium	S5	Forb	4	16	4

Notes:

Provincial Status (S-Rank): S1= Extremely Rare, S2= Rare, S3= Rare-Uncommon, S4= Common, S5= Very Common, SNA= Conservation status not applicable to species

* Sporadic distribution - description of plants encountered June 27-29, 2007

TABLE 4
SASKATCHEWAN CONSERVATION DATA CENTRE
SPECIES OF CONCERN RECORDED WITHIN THE R.M.s OF SASMAN AND FOAM LAKE

Common Name	Scientific name	Provincial Status (S)	National Status (G)	Provincial Protection Status
Birds				
Black Tern	*Chlidonias niger*	S4B,S4M	G4	--
Great Blue Heron	*Ardea herodias*	S3B	G5	--
Peregrine Falcon	*Falco peregrinus anatum*	S1B, S4M, S2N	G4T4	Vulnerable (proposed)
Piping Plover	*Charadrius melodus circumcinctus*	S3B	G3T3	Endangered
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	G5	--
Short-eared Owl	*Asio flammeus*	S3B, S2N	G5	--
Sprague's Pipit	*Anthus spragueii*	S4B	G4	Threatened (proposed)
Western Grebe	*Aechmophorus occidentalis*	S5B	G5	--
Yellow Rail	*Coturnicops noveboracensis*	S3B,S2M	G4	Vulnerable (proposed)
Migratory Bird Concentration Site	--	S3	--	--
Plants				
Five-foliate Cinquefoil	*Potentilla nivea var. pentaphylla*	S2	G5T4	--
Northern Dropseed	*Sporobolus heterolepis*	S3	G5	--
Crowfoot	*Viola pedatifida*	S3	G5	--
Immaculate Lily	*Lilium philadelphicum var. andinum f immaculata*	S1	G5TU	--
Invertebrates				
American Lady	*Vanessa virginiensis*	S2	G5	--

Notes:

Provincial Status (S-Rank): S1= Extremely Rare, S2= Rare, S3= Rare-Uncommon, S4= Common, S5= Very Common.

Global Status (G-rank): G1= Critically Imperiled, G2= Imperiled, G3= Vulnerable, G4= Apparently Secure, G5= Secure, G#G# indicates range of uncertainty in status

Status modifiers: B = For a migratory species, rank applies to the breeding population in the province,

N = For a migratory species, rank applies to the non-breeding population in the province,

M = For a migratory species, rank applies to the transient population,

T = Ranking for subspecies or varieties.

U = Status is uncertain.

TABLE 5
BIRD SPECIES RECORDED WITHIN THE REGIONAL STUDY AREA

Species	Scientific Name	Provincial Status (S)	National Status (G)	Number of Birds by Land Cover Categories (May 29-31, 2007)					
				Aspen	Cropland	Meadow	Pasture	Dugout	Wetland
Alder Flycatcher	Empidonax alnorum	S5B, S5M	G5	3					
American Bittern	Botaurus lentiginosus	S4B	G4			2			
American Coot	Fulica americana	S5B	G5	3	4	9			20
American Goldfinch	Carduelis tristis	S5B	G5	7					1
American Redstart	Setophaga ruticilla	S5B	G5	1					
American Robin	Turdus migratorius	S5B	G5	1			1		1
American White Pelican	Pelecanus erythrorhynchos	S3B	G4			4			
Baltimore Oriole	Icterus galbula	S5B	G5	2					
Black-capped Chickadee	Poecile atricapillus	S5	G5	2					
Brown-headed Cowbird	Molothrus ater	S5B	G5	9	1	3	1		2
Black Tern	Chlidonias niger	S4B, S4M	G4			5			7
Brewer's Blackbird	Euphagus cyanocephalus	S5B	G5						2
Bufflehead	Bucephala albeola	S5B, S3M, S1N	G5					1	
Blue-winged Teal	Anas discors	S5B, S5M	G5	4		3		3	17
Clay-coloured Sparrow	Spizella pallida	S5B	G5	11	6	19	5	2	9
Chipping Sparrow	Spizella passerina	S5B	G5			1			
Common Raven	Corus corax	S5	G5	1					
Common Yellowthroat	Geothlypis trichas	S5B	G5	2		5			5
Eastern Kingbird	Tyrannus tyrannus	S5B, S5M	G5			1	2		
Gadwall	Anas strepera	S5B,S5M,S2N	G5	1					3
Great Crested Flycatcher	Myiarchs crinitus	S5B,S5M	G5	2					
Gray Catbird	Dumetella carolinensis	S5B	G5	2					
Green-winged Teal	Anas crecca	S5B,S5M,S2N	G5	1					1
Harris' Sparrow	Zonotrichia querula	S5B	G5						1
Hairy Woodpecker	Picoides villosus	S5B,S5N	G5	1		1			
House Wren	Troglodytes aedon	S5B	G5	9		3			
Killdeer	Charadrius vociderus	S5B	G5		2	1			1
Le Conte's Sparrow	Ammodramus leconteii	S4B	G4	3		20	1		5
Least Flycatcher	Empidonax minimus	S5B,S5M	G5	19		3	1		
Least Sandpiper	Calidris minutilla	S4B,S4M	G5		1				
Lesser Scaup	Aythya affinis	S5B,S5M,S3N	G5						1
Mallard	Anas platyrhynchos	S5B,S5N	G5	2	3				1
Mountain Bluebird	Sialia currucoides	S5B	G5					1	

TABLE 5
BIRD SPECIES RECORDED WITHIN THE REGIONAL STUDY AREA

Species	Scientific Name	Provincial Status (S)	National Status (G)	Number of Birds by Land Cover Categories (May 29-31, 2007)					
				Aspen	Cropland	Meadow	Pasture	Dugout	Wetland
Mourning Dove	Zenaida macroura	S5B	G5	3					
Mourning Warbler	Oporornis philadelphia	S5B	G5	1					
Northern Flicker	Colaptes auratus	S4B,S4N	G5	1		1			
Northern Pintail	Anas acuta	S5B,S5M,S4N	G5	1					2
Northern Shoveler	Anas clypeata	S5B,S5M	G5		2	2		1	4
Nelson's Sharp-tailed Sparrow	Ammodramus nelsoni	S5B	G5	1		1	1		1
Ovenbird	Seiurus aurocapilla	S5B	G5	1					
Pied-billed Grebe	Podilymbus podiceps	S5B	G5						4
Pine Siskin	Carduelis pinus	S5B	G5			4			
Rose-breasted Grosbeak	Pheucticus ludovicianus	S5B	G5	1					
Redhead	Aythya americana	S5B,S5M,S2N	G5			1			3
Red-eyed Vireo	Vireo olivaceus	S5B	G5	8					1
Ruddy Duck	Oxyura jamaicensis	S5B	G5						2
Ruffed Grouse	Bonasa umbellus	S5B,S5N	G5	1					
Red-winged Blackbird	Agelaius phoeniceus	S5B	G5	3	10	10			19
Savannah Sparrow	Passerculus sandwichensis	S5B	G5	4	7	23	2		5
Sora	Porzana carolina	S5B	G5			5			11
Song Sparrow	Melospiza melodia	S5B	G5	3	3	7	1		3
Tree Swallow	Tachycineta bicolor	S5B,S5M	G5	2		1		1	
Veery	Catharus fuscescens	S5B	G5	3					
Vesper Sparrow	Pooecetes gramineus	S5B	G5		1	1			1
Virginia Rail	Rallus limicola	S4B	G5	1					
Warbling Vireo	Vireo gilvus	S5B	G5	3		1			
Western Meadowlark	Sturnella neglecta	S5B	G5					1	1
Willet	Tringa semipalmata	S5B,S4M	G5		1				
Wilson's Snipe	Gallinago delicata	S5N, S5M	G5	2	1	4		1	5
Wilson's Phalarope	Phalaropus tricolor	S5B,S5M	G5		5	3			5
White-throated Sparrow	Zonotrichia albicollis	S5B	G5	4		2			
Yellow-headed Blackbird	Xanthocephalus xanthocephalus	S5B	G5			1			2
Yellow Warbler	Dendroica petechia	S5B	G5	19		7			2
			Total Count	**148**	**47**	**154**	**15**	**11**	**148**

Notes:

Provincial Status (S-Rank): S1= Extremely Rare, S2= Rare, S3= Rare-Uncommon, S4= Common, S5= Very Common.

Global Status (G-rank): G1= Critically Imperiled, G2= Imperiled, G3= Vulnerable, G4= Apparently Secure, G5= Secure, G#G# indicates range of uncertainty in status

Status modifiers: B = For a migratory species, rank applies to the breeding population in the province,

N = For a migratory species, rank applies to the non-breeding population in the province,

M = For a migratory species, rank applies to the transient population,

TABLE 6
CATEGORIES OF ADVERSE BIOPHYSICAL,
SOCIO-ECONOMIC AND CULTURAL EFFECTS

Adversity Category	Biophysical	Socio-Economic	Physical and Cultural Heritage
Negligible	Effect on the population or a specific group of individuals at a local project area and/or over a short period in such a way as to be similar to small random changes in the population due to environmental irregularities but having no measurable effect on the population as a whole.	Effect of either very short duration or affects a small group of people or which occurs in the local project area in a manner similar to small random changes to extraneous irregularities, but having no measurable effect on the population as a whole.	Effect on physical and cultural heritage resources of short duration and in the local project area. The effect on physical and cultural resources is not detectable. The resources are not publicly recognized or protected by legislation.
Minor	Effect on a specific group of individuals in a population in the project area and/or over a short period (one generation or less), but not affecting other trophic levels or the integrity of the population itself.	Effect either of short-term duration or affects a specific group of people in the local project area but not necessarily affecting the integrity of the entire group itself.	Effect on physical and cultural heritage resources of short duration but over the adjacent local area. The effect on physical and cultural resources is minor or repairable. The resources are publicly recognized but not protected by legislation.
Moderate	Effect on a portion of a population that results in a change in abundance and/or distribution over one or more generations of that portion of the population or any population dependent upon it, but does not change the integrity of any population as a whole. The effect may be localized.	Effect either of medium-term duration (which affects one or two generations and/or the portion of the population dependent upon it) or affects a moderate portion of the population without affecting the integrity of the population as a whole.	Effects on physical and cultural heritage resources of moderate duration. Resources affected over the adjacent local area. The effect on physical and cultural resources is reversible. The resources are protected by legislation.
Major	Effect on a whole stock or population of a species in sufficient magnitude to cause a decline in abundance and/or change in distribution beyond which natural recruitment would not return that population or species dependent upon it, to its former level within several generations.	Effect either of long duration (lasting several generations) or affecting an entire definable group of people in sufficient magnitude to cause severe change in economic, physical or psychological well-being or long established activity patterns that would not return to pre-project levels or patterns within several generations.	Effect on physical and cultural heritage resources of long duration. Resources affected over large regional area. There is an irreversible effect on physical/cultural resources. The resources are protected by legislation.

TABLE 7
CRITERIA AND RATINGS FOR EVALUATING SIGNIFICANCE

Criteria	Rating		
	1	2	3
a) Societal value of the affected environmental components – includes nature and degree of protection provided	Not valuable (no designation)	Moderately valuable (designated or protected locally, regionally or provincially)	Highly valuable (designated or protected nationally or internationally)
b) Ecological value – includes rarity and uniqueness, fragility, importance within ecosystem, importance to scientific studies	Not valuable	Moderately valuable	Highly valuable
c) Duration – length of time the project activity will last	Short-term (less than 1 year)	Moderate (between 1 and 100 years)	Long-term (more than 100 years)
d) Frequency – rate of reoccurrence of the project activity causing the effect	Rarely (less than once per year)	Sporadically (less than once per month)	Frequently (more than once per week)
e) Geographic extent – area over which the effect will occur	Single point	Localized	Regional or greater
f) Magnitude – predicted disturbance compared to existing conditions	No measurable disturbance	Measurable disturbance but no loss of function	Measurable disturbance with loss of function
g) Reversibility – time the environmental component will take to recover after the source of the effect ceases	Less than a year	Between 1 and 100 years	Irreversible

TABLE 8
ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY
FOR THE PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Environmental Effect	Adversity (Table 6)	Mitigation Measures	Follow-up	Significance (S)* (see Table 7)							
				a	b	c	d	e	f	g	S
Air Quality											
Increased fugitive dust from site preparation and construction activities	Minor	Use of approved dust suppressant such as water Limit and cover stockpiled materials Control construction vehicle speeds Cover trucks hauling materials to the site Limit construction activities during high wind events Re-establish vegetation on disturbed areas	Periodic observations for fugitive dust levels Inspection of local areas for accumulated dust Monitor complaints Adhere to contract specifications	2	1	1	3	2	2	1	N
Increased NO_x, SO_2 and greenhouse gas levels from equipment and vehicle emissions during construction	Minor	Use of low sulphur-containing fuels Require high standard of maintenance for construction equipment and vehicles Limit unnecessary long-term idling	Periodic inspections during construction Monitor adherence to contract specifications and license terms and conditions	2	2	1	3	2	2	1	N
Increased VOC from fuels, and other substances during construction	Minor	Use appropriate dispensing equipment Limit fueling of equipment and vehicles	Submission of MSDS for all products used Periodic inspections for VOC sources Monitor adherence to contract specifications	2	2	1	3	2	2	1	N
Soils											
Loss of soil due to clearing and excavation activities during construction (only areas directly surrounding borrow pits)	Negligible	Minimize soil loss or disturbance onsite Stockpile surface soil for later use Reclaim and re-vegetate	Periodic inspections of stockpiled soil Ensure adherence to contract specifications	1	2	1	3	2	1	1	N
Disruption and compaction of soils during site preparation and construction	Minor	Minimize surface disturbance of soils Restrict activities to previously disturbed areas	Periodic inspections of disturbed areas Ensure adherence to contract specifications	1	2	1	3	2	1	1	N

TABLE 8 (CONTINUED)
ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY
FOR THE PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Environmental Effect	Adversity (Table 6)	Mitigation Measures	Follow-up	Significance (S)* (see Table 7)							
				a	b	c	d	e	f	g	S
Contamination of soils during construction from leaks, accidental spills, or releases of fuels or other hazardous substances	Moderate	Prevent leaks, spills and releases by providing secondary containment for fuel and hazardous material storage Require drip trays for equipment Provide spill clean-up equipment/materials Excavation of contaminated soil with disposal at an approved site Prepare emergency spill response plan	Periodic inspections for leaks, spills and releases Ensure adherence to contract specification and license terms and conditions Periodic updates of emergency response plan	2	2	1	1	1	2	1	N
Surface Water											
Loss of wetland adjacent to the shores of Fishing Lake	Minor	Minimize the disturbed area Avoid further disturbance of intermittent water bodies	Periodic inspections during wet conditions	1	2	3	2	2	3	2	N
Localized modified surface water runoff regime	Moderate	Limit surface area disturbance Provide erosion control along water drainage routes Monitor surface water runoff	Periodic inspections for ponding after freshet and precipitation events	1	1	3	2	2	2	1	N
Elevated suspended sediment levels in the lake from construction activities	Moderate	Use sediment barriers and turbidity curtains during construction Remove sediment collected by turbidity curtains	Monitor surface water runoff and suspended sediment levels Monitor turbidity curtain condition Periodic inspections for erosion Ensure adherence to contract specifications and license terms and conditions	3	2	1	3	2	2	1	N
Contamination of surface water from leaks and accidental spills, releases of fuels or other hazardous substances during construction	Moderate	Prevent leaks, spills and releases by providing secondary containment for fuel and hazardous material storage Require drip trays for equipment Refuel and conduct maintenance only when equipment is away from the water Provide spill clean-up equipment and materials Prepare emergency spill response plan	Periodic inspections for leaks, spills and releases with daily inspection for equipment working on the lakeside or top of berms Ensure adherence to contract specifications and license terms and conditions Periodic updates of emergency response plan	3	3	1	1	2	2	2	N

TABLE 8 (CONTINUED)
ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY
FOR THE PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Environmental Effect	Adversity (Table 6)	Mitigation Measures	Follow-up	Significance (S)* (see Table 7)							
				a	b	c	d	e	f	g	S
Groundwater											
Increased infiltration and possible modification of groundwater regime from site preparation and construction	Negligible	None proposed	Tracking and responding to any complaints from area residents related to groundwater well problems	2	2	2	3	2	1	1	N
Contamination of groundwater from leaks, accidental spills, or releases of fuels or hazardous substances	Moderate	Prevent leaks, spills and releases by providing secondary containment for fuel and hazardous material storage Require drip trays for equipment Provide spill clean-up equipment and materials Prepare emergency spill response plan	Periodic inspections for leaks, spills and releases Periodic updates of emergency response plan Ensure adherence to contract specifications and license terms and conditions	3	2	2	1	2	3	2	N
Vegetation											
Loss and disturbance of terrestrial and possibly some aquatic vegetation during site preparation and construction	Minor	Minimize loss and disturbance to vegetation Limit construction activities to designated and previously disturbed areas Re-vegetate disturbed and reclaimed areas after construction	Periodic inspections of vegetation during construction Maintain re-vegetated areas Ensure adherence to contract specifications and license terms and conditions	2	2	1	3	2	2	2	N
Impairment of vegetation from dust accumulation during site preparation and construction	Negligible	Control dust using approved suppressant Restrict activities during high wind events	Periodic inspections of vegetation for accumulated dust Monitor complaints during and after construction	1	2	1	3	2	2	1	N
Wildlife											
Loss and disturbance of wildlife habitat associated with construction	Minor	Minimize loss and disturbance of vegetation Limit construction activities to designated and previously disturbed areas Re-vegetate disturbed or reclaimed areas during and after construction	Periodic inspections during and after construction Maintain re-vegetated areas Ensure adherence to contract specifications and license terms and conditions	1	2	1	3	2	2	2	N

TABLE 8 (CONTINUED)
ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY
FOR THE PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Environmental Effect	Adversity (Table 6)	Mitigation Measures	Follow-up	Significance (S)* (see Table 7)							
				a	b	c	d	e	f	g	S
Loss and disturbance of small/burrowing mammals during site preparation and construction	Minor	Minimize area of disturbance Confine construction activities to previously disturbed areas	Maintain records of small and burrowing mammal mortalities due to construction activities and vehicles	1	2	1	3	2	2	2	N
Increased wildlife-vehicle interactions and associated wildlife mortalities, vehicle damage and human injury or death	Minor	Operate transport trucks during daylight hours Provide wildlife awareness information to drivers Adhere to existing speed limits	Maintain records of vehicle-wildlife interactions	1	2	1	2	2	2	1	N
Temporary disturbance of waterfowl and shorebird habitat during construction	Minor	Minimize disturbance to aquatic vegetation Limit construction activities to designated and previously disturbed areas	None Proposed	1	2	1	3	2	2	2	N
Disturbance of migratory bird nesting and rearing due to construction activities	Negligible	None proposed	None proposed	1	2	1	2	2	2	1	N
Aquatic Biota/Habitat											
Potential impact to fish resulting from dewatering construction areas along the lake	Moderate	Use of screened intakes suspended in the water column when filling the Aqua Dams® and while dewatering and refilling the work areas bound by the Aqua Dams® Conducting fish salvage of enclosed shorelines prior to dewatering once the Aqua Dams® are in place Excess water to be dewatered from construction area and water drained from the Aqua Dams® after construction will be discharged over freshly placed riprap covered by dissipation mats Sediment barriers and turbidity curtains will be used during construction and sediment collected by turbidity curtains will be removed	Periodic inspections of the Aqua Dams® during construction Monitoring the enclosed water during the dewatering process to recover any fish discovered that were not relocated during fish salvage Recording any fish kills that occur during the dewatering process	3	2	1	2	2	3	2	N

TABLE 8 (CONTINUED)
ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY
FOR THE PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Environmental Effect	Adversity (Table 6)	Mitigation Measures	Follow-up	Significance (S)* (see Table 7)							
				a	b	c	d	e	f	g	S
Disturbance to fish habitat from construction activities	Minor	Conduct most of the work from the berm to prevent further disturbance to fish habitat Limiting activities in areas with higher valued habitat Adhere to DFO in-water work restrictions Use of sediment barriers and turbidity curtains during construction and removal of sediment collected by turbidity curtains	Bio-monitoring of Fishing Lake	3	2	1	3	2	3	2	N
Loss and disturbance of fish and fish habitat due to contamination from leaks and accidental spills, releases of fuels or other hazardous substances during construction	Moderate	Prevent leaks, spills and releases by providing secondary containment for fuel and hazardous material storage Require drip trays for equipment Provide spill clean-up equipment and materials Prepare emergency spill response plan	Periodic inspections for leaks, spills and releases Periodic updates of emergency response plan Ensure adherence to contract specifications and license terms and conditions	3	2	1	1	2	3	2	N
Economic Conditions											
Short-term increase from purchase of construction supplies; long-term security from flooding and associated economic strain	Positive	None proposed	None proposed	2	1	2	2	2	2	1	N
Employment											
Potential indirect increase in employment for services to support increased tourist visits with threat of flooding removed	Positive	None proposed	None proposed	2	1	2	2	2	1	1	N
Land-Use/Zoning											
Possible loss of agricultural land around borrow pits and disturbance of residential land-use due to berm construction	Moderate	Limit construction activities to designated and previously disturbed areas Reclaim and re-seed disturbed areas after construction is complete Prevent leaks, spills and releases	Periodic inspections of disturbed areas Ensure adherence to contract specifications	3	1	1	2	2	2	1	N

TABLE 8 (CONTINUED)
ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY
FOR THE PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Environmental Effect	Adversity (Table 6)	Mitigation Measures	Follow-up	Significance (S)* (see Table 7)							
				a	b	c	d	e	f	g	S
Human Health											
Increase in noise and vibration levels from the use of heavy equipment during site preparation and construction	Moderate	Limit noise-creating activities, including heavy equipment operation and truck movements, to normal working hours Muffle vehicles and equipment Limit unnecessary long-term idling Require a high standard of maintenance for heavy equipment	Periodic inspections of noise levels at the site Monitor public complaints Ensure adherence to contract specifications and license terms and conditions	2	1	1	3	2	2	1	N
Increased levels of stress affecting residents' well being due to construction activities	Minor	Limit access of construction vehicles and equipment to designated areas Limit noise-creating activities, including heavy equipment operation and truck movements, to normal working hours Muffle vehicles and equipment Limit unnecessary long-term idling Require a high standard of maintenance for heavy equipment	Monitor adherence to license terms and conditions Track complaints from area residents	2	1	1	3	2	2	1	N
Risk of increased incidences of acute and chronic respiratory conditions triggered by reduced air quality from construction activities	Minor	Use of approved dust suppressant Cover loads hauled to and from the site Control construction vehicle speeds Limit construction during high wind events Require high standard of maintenance for construction equipment and vehicles Limit unnecessary long-term idling Use low-sulfur containing fuels Re-establish vegetation on disturbed areas	Periodic inspections of local area for dust accumulation Ensure adherence to contract specifications Monitor health complaints	2	1	1	2	2	2	1	N

TABLE 8 (CONTINUED)
ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY
FOR THE PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Environmental Effect	Adversity (Table 6)	Mitigation Measures	Follow-up	Significance (S)* (see Table 7)							
				a	b	c	d	e	f	g	S
Potential adverse health effects due to possible soil, surface water and groundwater contamination during construction	Moderate	Prevent leaks, spills and releases Provide secondary containment for fuel storage Require drip trays for equipment Provide spill clean-up equipment and materials Comply with provincial fuel storage and dispensing regulations Store hazardous materials in approved containers Provide an emergency spill response plan	Periodic inspections of equipment and storage containers for leaks, spills and releases Remediate and record fuel spills and releases Periodic updates of the emergency response plan Ensure adherence to contract specifications and license terms and conditions	3	1	1	1	2	2	2	N
Potential adverse effects of construction activities on public safety	Minor	Inform community members of construction activities and timetables through community announcements Post signage indicating dangers leading to and associated with the site Utilize traffic control signs and flag persons at intersections to control public traffic and prevent unauthorized vehicle access Instruct workers to be aware of public	Record any issues associated with the public	2	1	1	3	2	2	1	N
Potential adverse effects of construction activities on worker safety	Minor	Comply with the Saskatchewan occupational health and safety regulations Conduct safety briefings with workers Enforce standard operation procedure guidelines Provide employee training	Record the occurrence of workplace accidents Update training and safety guidelines as required	2	1	1	3	2	2	1	N

TABLE 8 (CONTINUED)
ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY
FOR THE PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Environmental Effect	Adversity (Table 6)	Mitigation Measures	Follow-up	Significance (S)* (see Table 7)							
				a	b	c	d	e	f	g	S
Aesthetic Values											
Potential adverse effects on aesthetic quality	Minor	Minimize the loss and disturbance of vegetation Limit construction activities to designated and previously disturbed areas Re-vegetate disturbed areas after construction Implement dust control methods Cover loads during transport to and from the site	Observe dust levels and debris during construction Maintain re-vegetated areas Record public complaints Adhere to contract specifications and license terms and conditions	2	1	1	3	2	2	2	N

* S = significance, N = not significant and Y = significant

TABLE 9
PROJECT AND CUMULATIVE ENVIRONMENTAL EFFECTS
FOR THE FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Project Activities	Residual Environmental Effects																
x **Project effect (minor)** **X Project effect (moderate)** **P Project effect (major)** o **Cumulative effect (negligible)** **O Cumulative effect (minor)** **C Cumulative effect (major)**	**Increased particulates**	**Increased greenhouse gases**	**Increased SO_2, NOx, etc.**	**Disturbance or loss of soil**	**Contamination of soils**	**Loss of wetlands**	**Modification in surface water flow**	**Contamination of surface water**	**Contamination of groundwater**	**Loss and disturbance of terrestrial vegetation**	**Increased wildlife mortalities**	**Disturbance to shore and migratory bird habitat**	**Loss of fish and fish habitat**	**Increased Noise**	**Impacts to human health**	**Loss of agricultural land**	**Impaired aesthetic values**
Proposed Project																	
Site preparation	x	x	x		x			x	x	x				x	x		
Construction	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x
Operation						x	x			x			x				
Other Projects and Activities																	
Fishing Lake Reserve	o	o	o		o			o	o								
Organized hamlet of Kylemore		o	o		o			o	o								
Organized hamlet of Kuroki		o	o		o			o	o								
Highway 310 Asphalt Upgrades	o	o	o		o			o	o		o			o	o		o
Small-scale Residential Repairs	o			o										o			
CN and CP Rail lines		o	o		o			o	o		o						

TABLE 10
MITIGATION MEASURES SUMMARY FOR THE
PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Mitigation Measures	Design	Proposed	Regulatory	Management	Responsibility
Air Quality					
Limit and cover stock piled material		•			
Use an approved dust suppressant and control vehicle speed		•		•	
Limit construction activity during high wind events		•		•	
Re-establish vegetation on disturbed areas		•			
Require a high standard of maintenance for construction equipment and vehicles, use low sulphur-containing fuels and limit unnecessary idling				•	
Using appropriate dispensing equipment and limiting fuelling of vehicles and equipment				•	
Soils					
Minimize soil loss or disturbance and stockpile surface soils, reclamation and re-seeded with grass		•			
Restrict activities to previously disturbed areas and provide gravel pads or do winter construction	•				
Prevent leaks, spills and releases and provide fuel storage secondary containment	•		•		
Provide drip trays for equipment and spill clean-up equipment and materials				•	
Preparing an emergency (spill) response plan				•	
Complying with provincial fuel storage and dispensing regulations and storing hazardous materials in approved containers			•		
Surface Water					
Limit surface area disturbance, provide erosion control as required along drainage routes	•				

TABLE 10 (CONTINUED)
MITIGATION MEASURES SUMMARY FOR THE
PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Mitigation Measures	Design	Proposed	Regulatory	Management	Responsibility
Use of sediment barriers and turbidity curtains during construction and removal of sediment collected by turbidity curtains	•	•			
Prevent leaks, spills and releases and provide fuel storage secondary containment	•				
Provide drip trays for equipment and spill clean-up equipment and materials				•	
Preparing an emergency (spill) response plan				•	
Complying with provincial fuel storage and dispensing regulations and storing hazardous materials in approved containers			•		
Groundwater					
Prevent leaks, spills and releases and provide fuel storage secondary containment	•				
Provide drip trays for equipment and spill clean-up equipment and materials				•	
Preparing an emergency (spill) response plan				•	
Complying with provincial fuel storage and dispensing regulations and storing hazardous materials in approved containers			•		
Vegetation					
Restrict activities to previously disturbed areas	•				
Minimize vegetation loss or disturbance		•			
Re-vegetate disturbed and reclaimed areas during and after construction	•				
Use an approved dust suppressant and limit construction activity during high wind events		•		•	
Control ignition sources during construction, and provide buffer areas around flammable substances				•	
Prepare an emergency fire response plan and provide on-site fire suppression capabilities				•	

TABLE 10 (CONTINUED)
MITIGATION MEASURES SUMMARY FOR THE
PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Mitigation Measures	Design	Proposed	Regulatory	Management	Responsibility
Wildlife					
Restrict activities to previously disturbed areas	•				
Minimize habitat (vegetation) loss or disturbance		•			
Re-vegetate disturbed and reclaimed areas during and after operation	•				
Operate transport trucks during daylight hours and post signs to warn and educate drivers to avoid wildlife on the highway and adhere to existing speed limits				•	
Aquatic Biota/Habitat					
Conducting most of the work from the berm to prevent further disturbance to fish habitat	•				
Limiting activities in areas with higher valued habitat		•			
Use of sediment barriers and turbidity curtains during construction and removal of sediment collected by turbidity curtains	•	•			
Use of screened intakes suspended in the water column when filling the Aqua Dams® and while dewatering and refilling the work areas bound by the Aqua Dams®	•				
Conducting fish salvage of enclosed shorelines prior to dewatering once the Aqua Dams® are in place	•		•		
Excess water to be dewatered from construction area and water drained from the Aqua Dams® after construction will be discharged over freshly placed riprap covered with energy dissipation mats	•	•			
Prevent leaks, spills and releases and provide fuel storage secondary containment	•				
Provide drip trays for equipment and spill clean-up equipment and materials				•	
Preparing an emergency (spill) response plan				•	
Complying with provincial fuel storage and dispensing regulations and storing hazardous materials in approved containers			•		

TABLE 10 (CONTINUED)
MITIGATION MEASURES SUMMARY FOR THE
PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Mitigation Measures	Design	Proposed	Regulatory	Management	Responsibility
Social Conditions and Human Health					
Limiting Construction activities to designated and previously disturbed areas	•				
Reclamation and re-vegetation after construction activities	•				
Measures to prevent leaks and spills		•			
Limit noise-creating activities to normal working hours				•	
Muffling vehicles/equipment and limiting long-term idling				•	
Require a high standard of maintenance for construction equipment and vehicles				•	
Minimize dust by covering loads in transport and sue of approved dust suppressants on gravel roads, and limit construction in high wind events				•	
Use of low sulphur-containing fuels				•	
Re-establish vegetation on disturbed areas	•			•	
Provide secondary containment for fuel storage, require drip trays for equipment, provide spill clean-up equipment and materials, comply with provincial fuel storage and dispensing regulations, store hazardous materials in approved containers and provide emergency spill response plan		•	•	•	
Inform community of construction activities and prevent unauthorized vehicle access and instruct workers to be aware of public interactions				•	
Compliance with Saskatchewan occupational health and safety regulations, conducting safety meetings with workers, enforcement of standard operation procedure guidelines, and provision of training to employees			•	•	
Human health protected by mitigation measures to control contamination of air, soil, surface water and groundwater quality	•	•	•	•	

TABLE 10 (CONTINUED)
MITIGATION MEASURES SUMMARY FOR THE
PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Mitigation Measures	Design	Proposed	Regulatory	Management	Responsibility
Aesthetic Values					
Minimize loss and disturbance of vegetation, limiting construction activities to designated and previously disturbed areas, and re-vegetate disturbed areas after construction		•			
Implement dust control methods		•			

TABLE 11
FOLLOW-UP SUMMARY FOR THE
PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Follow-up	Inspecting	Monitoring	Record Keeping	Reporting	Oversight
Microclimate					
Inspect airflow and snow deposition patterns	•				
Outdoor Air Quality					
Observe fugitive dust levels during construction and accumulated dust during operation	•				
Monitoring & tracking complaints from local residents			•		
Inspect for VOC sources	•				
Inspection during construction and monitoring for adherence to contract specifications and license terms and conditions	•				
Submission of MSDSs for all products used			•	•	
Soils					
Periodic inspections of stockpiled soil	•				
Periodic inspections of disturbed areas	•				
Periodic inspections for leaks, spills and releases	•			•	
Updating emergency (spill) response plan			•	•	
Inspection during construction and monitoring for adherence to contract specifications and license terms and conditions	•				
Surface Water					
Inspect intermittent water bodies located along proposed berms during wet conditions	•				
Inspection of turbidity curtains	•				
Periodic inspections for ponding after the freshet and precipitation events	•				
Monitor surface water runoff and suspended sediment levels, and condition of turbidity curtains		•		•	
Periodic inspections for erosion and ensuring adherence to contract specifications and license terms and conditions	•				
Periodic inspection for leaks, spills and releases, and periodic updates of the emergency response plan	•				

TABLE 11 (CONTINUED)
FOLLOW-UP SUMMARY FOR THE
PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Follow-up	Inspecting	Monitoring	Record Keeping	Reporting	Oversight
Groundwater					
Responding to complaints from areas residents			•		
Periodic inspection for leaks, spills, and releases	•				
Ensuring adherence to contract specifications to license condition, and periodic updates to emergency response plan			•		
Vegetation					
Inspecting re-vegetation during construction	•				
Adherence to contract specifications and license terms and conditions			•		
Periodic inspection for dust on vegetation	•				
Monitoring and tracking complaints from local residents			•		
Wildlife/Habitat					
Periodic inspection during and after construction, and adherence to contract specification and license terms and conditions	•				
Maintenance of re-vegetated areas	•				
Recording small and large mammal mortalities due to construction, and any wildlife-vehicle interactions			•		
Minimize disturbance to aquatic vegetation and limit construction activities toe designated / previously disturbed areas.	•				
Aquatic Biota/Habitat					
Bio-monitoring of Fishing Lake		•		•	
Periodic inspections of the Aqua Dams® during construction	•				
Monitoring the enclosed water during the dewatering process to recover any fish discovered that were not relocated during fish salvage	•				
Recording any fish kills that occur during the dewatering process	•		•		
Periodic inspection for leaks, spills and releases, and periodic updates of the emergency response plan	•				

TABLE 11 (CONTINUED)
FOLLOW-UP SUMMARY FOR THE
PROPOSED FISHING LAKE FLOOD CONTROL BERM UPGRADING PROJECT

Follow-up	Inspecting	Monitoring	Record Keeping	Reporting	Oversight
Human health and safety					
Periodic inspection of the site for noise levels	•				
Monitoring & tracking complaints from local residents			•		
Ensure adherence to contract specifications and license terms and conditions			•		
Periodic inspection of local area for accumulated dust	•				
Monitor health complaints			•		
Inspection of equipment and storage container for leaks, spills and releases	•				
Record any workplace accidents and update training and safety guidelines			•		
Aesthetic values					
Observing dust levels and debris during construction	•				
Maintenance of re-vegetated areas	•			•	
Recording public complaints			•		