

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	LOCATION.....	1
1.2	PROJECT OWNERSHIP AND LICENSING	3
1.3	HISTORY	3
1.4	LOCAL AND GLOBAL CONTRIBUTIONS OF THE TANCO MINE.....	4
1.5	NEED FOR THE PROJECT.....	4
1.6	PROJECT OVERVIEW.....	5
1.7	REGULATORY FRAMEWORK.....	6
1.7.1	PROVINCIAL INVOLVEMENT.....	6
1.7.1.1	Environment Act Licence Alteration Process.....	6
1.7.2	FEDERAL INVOLVEMENT	7
1.7.3	FINANCIAL SUPPORT	7
1.7.4	LAND REQUIREMENTS	7
1.7.5	REGULATORY REQUIREMENTS	7
1.8	PROJECT SCHEDULE.....	8
1.9	DOCUMENT ORGANIZATION.....	8
2.0	PROJECT DESCRIPTION	10
2.1	MINERAL & SURFACE RIGHTS.....	10
2.2	GEOLOGICAL RESOURCES & MINE LIFE	10
2.3	CURRENT OPERATIONS.....	11
2.3.1	EXISTING SURFACE FACILITIES & INFRASTRUCTURE.....	11
2.3.2	MINING.....	11
2.3.3	MINING METHOD AND PRODUCTION RATES.....	11
2.3.4	MINE OPENINGS AND VENTILATION	15
2.3.5	UNDERGROUND INFRASTRUCTURE	15
2.3.6	MINE WATER MANAGEMENT	15
2.3.7	MINING WASTE	17
2.3.8	MILLING & TAILINGS MANAGEMENT.....	17
2.3.9	WATER USE & MANAGEMENT	17
2.3.10	WASTE MANAGEMENT.....	18
2.3.11	SITE RUNOFF MANAGEMENT	18
2.3.12	DISCHARGES TO WATER	19
2.3.13	EMISSIONS MANAGEMENT	23
2.3.13.1	Air	23
2.3.13.2	Greenhouse Gas Emissions.....	23
2.3.14	SITE SECURITY	24
2.3.15	CONTINGENCY AND EMERGENCY RESPONSE PLAN	24
2.4	PROPOSED ACTIVITIES.....	24
2.4.1	QUARRYING.....	24
2.4.2	TEMPORARY ACCESS ROAD AND STAGING AREA	24

2.4.3	TEMPORARY DIKE	25
2.4.4	TEMPORARY DEWATERING	28
2.4.5	TEMPORARY WATER MANAGEMENT	29
2.4.6	EFFLUENT MANAGEMENT	31
2.4.7	PERMANENT DIKE	31
2.5	DECOMMISSIONING AND RECLAMATION	31
3.0	EVALUATION OF ALTERNATIVES	32
3.1	OPTION 1 - DO NOTHING	32
3.2	OPTION 2 – IN-SITU REINFORCEMENT OF THE CROWN PILLAR	32
3.3	OPTION 3 – ISOLATION OF THE MINE FROM THE LAKE	33
3.4	PREFERRED APPROACH	33
3.5	DIKE ALIGNMENT ALTERNATIVES	33
3.5.1	OPTION 3A – ARC DIKE	33
3.5.2	OPTION 3B – V - DIKE	33
3.5.3	OPTION 3C – NARROWS DIKE	34
3.5.4	PREFERRED APPROACH	34
3.6	DEWATERING OPTIONS	36
3.6.1	OPTION 1 – DEWATER DIRECTLY TO THE BIRD RIVER	36
3.6.2	OPTION 2 – SURGE/SETTLING POND AND FILTRATION	36
3.6.3	OPTION 3 – DISCHARGE TO THE SHATFORD LAKE WATERSHED	36
3.6.4	OPTION 4 – DISCHARGE TO A TREATMENT WETLAND	37
3.6.5	PREFERRED APPROACH	37
3.7	WATER MANAGEMENT OPTIONS	37
3.7.1	OPTION 1 – ALLOW EXCESS WATER TO SPILL INTO THE WEST BASIN	37
3.7.2	OPTION 2 – DISCHARGE DIRECTLY TO THE BIRD RIVER	37
3.7.3	OPTION 3 – DISCHARGE TO THE TREATMENT WETLANDS	38
4.0	SCOPE OF ASSESSMENT	39
4.1	SPATIAL	39
4.2	TEMPORAL	39
4.3	KEY ISSUES AND POTENTIAL ENVIRONMENTAL EFFECTS	39
5.0	ENVIRONMENTAL SETTING	42
5.1	PHYSICAL ENVIRONMENT	42
5.1.1	CLIMATE	42
5.1.2	NOISE	42
5.1.3	TOPOGRAPHY & SOILS	42
5.1.4	HYDROGEOLOGY	43
5.1.5	TAILINGS PILE HYDROGEOLOGY	43
5.1.5.1	East Tailings Management Area	43
5.1.5.2	West Tailings Management Area	44
5.2	TERRESTRIAL ENVIRONMENTAL	44
5.2.1	VEGETATION	44
5.2.2	WILDLIFE	47
5.2.3	SPECIES AT RISK AND CRITICAL HABITAT	47
5.3	AQUATIC ENVIRONMENT	49
5.3.1	SURFACE HYDROLOGY	49

5.3.1.1	Bernic Lake.....	49
5.3.1.2	Bernic Creek.....	51
5.3.1.3	Bird River.....	51
5.3.2	PHYSICAL LIMNOLOGY OF BERNIC LAKE.....	52
5.3.3	BERNIC LAKE WATER QUALITY.....	52
5.3.3.1	Bernic Lake.....	52
5.3.4	BERNIC CREEK.....	79
5.3.4.1	Bird River Water Quality.....	79
5.3.5	SEDIMENT QUALITY.....	79
5.3.5.1	Sediment Quality of Bernic Lake.....	79
5.3.5.2	Bernic Creek.....	86
5.3.5.3	Sediment Quality of Bird River.....	86
5.3.6	BENTHIC INVERTEBRATES.....	86
5.3.6.1	Bernic Lake.....	86
5.3.6.2	Bernic Creek.....	91
5.3.6.3	Bird River.....	91
5.3.7	FISH AND FISH HABITAT.....	92
5.3.7.1	Bernic Lake.....	92
5.3.7.2	Bernic Creek.....	95
5.3.7.3	Bird River.....	95
5.3.8	SPECIES AT RISK.....	96
5.4	HUMAN ENVIRONMENT.....	96
5.4.1	REGIONAL AREA OF INTEREST.....	96
5.4.1.1	Municipalities.....	97
5.4.1.2	First Nations.....	98
5.4.2	REGIONAL ECONOMY.....	98
5.4.3	REGIONAL LABOUR FORCE.....	99
5.4.4	LAND USE.....	101
5.4.4.1	Provincial Parks.....	101
5.4.4.3	Recreational Use.....	102
5.4.4.4	Resource Use.....	102
5.4.4.5	Traditional Use.....	102
5.4.5	ARCHAEOLOGICAL RESOURCES.....	102
5.4.6	LOCAL TRAFFIC.....	104
6.0	ENVIRONMENTAL IMPACT ASSESSMENT & MITIGATION PLAN.....	106
6.1	PHYSICAL ENVIRONMENT.....	106
6.1.1	LANDFORMS.....	106
6.1.2	AIR QUALITY AND NOISE.....	106
6.1.3	HYDROGEOLOGY.....	107
6.2	TERRESTRIAL ENVIRONMENT.....	107
6.2.1	FLORA AND FAUNA.....	107
6.2.2	WETLANDS.....	108
6.3	AQUATIC ENVIRONMENT.....	109
6.3.1	SURFACE HYDROLOGY.....	109
6.3.2	WATER QUALITY.....	110
6.3.3	FISH AND FISH HABITAT.....	111
6.4	HUMAN ENVIRONMENT.....	111

6.4.1	LOCAL ECONOMY.....	111
6.4.2	HERITAGE RESOURCES.....	111
6.4.3	LAND AND RESOURCE USE.....	112
7.0	MONITORING	113
8.0	PUBLIC INVOLVEMENT	114
8.1	OBJECTIVES	114
8.2	PUBLIC INVOLVEMENT ACTIVITIES.....	114
8.2.1	STAKEHOLDER IDENTIFICATION	114
8.2.2	MAIL-OUT.....	115
8.2.3	ADVERTISING.....	115
8.2.4	LAC DU BONNET OPEN HOUSE	115
8.2.5	BIRD RIVER OPEN HOUSE	116
8.3	PUBLIC RESPONSE	116
8.4	FIRST NATIONS ENGAGEMENT	118
8.5	MÉTIS ENGAGEMENT	119
8.6	REGULATORY INVOLVEMENT	119
8.7	CONTINUING COMMUNICATION	119
9.0	REFERENCES.....	121

APPENDIX A	CROWN PILLAR ASSESSMENT
APPENDIX B	EMERGENCY RESPONSE PLAN
APPENDIX C	TANCO PUBLIC ENGAGEMENT CONTACT LIST AND NOTIFICATION LETTER
APPENDIX D	TANCO OPEN HOUSE ADVERTISEMENTS
APPENDIX E	TANCO OPEN HOUSE DISPLAY BOARDS

LIST OF TABLES

Table 2. 1	Effluent characterization by sampling period in the TANCO Mine West Discharge, 2012. Shaded values exceed the Manitoba Water Quality Standards, Objectives and Guidelines (MWQSOG) for the protection of aquatic life. Units are mg/L unless otherwise noted.....	20
Table 5. 1	Physical characteristics of Bernic Lake and its watershed	49
Table 5. 2	Bird River monthly flow statistics (m ³ /s). Data from Environment Canada (2009).....	51
Table 5. 3	Water quality in Bernic Lake; 1968 to 1975 and 2002 to 2012. Shaded values exceed the Manitoba Water Quality Standards, Objectives and Guidelines for the Protection of Aquatic Life (MWQSOG; Williamson 2011). See Figure 5.4 for sampling locations Units are mg/L except as noted.....	58
Table 5. 4	Water quality in Tulabi Lake; 2005 to 2012. Shaded values exceed the Manitoba Water Quality Standards, Objectives and Guidelines for the Protection of Aquatic Life (MWQSOG; Williamson 2011).....	62
Table 5. 5	Dissolved metal concentrations (mg/L) in Bernic Lake; 2002 to 2012. (no data available for 1968 to 1975). Shaded values exceed the Manitoba Water Quality Standards, Objectives and Guidelines	65
Table 5. 6	Dissolved metal concentrations (mg/L) in Tulabi Lake; 2005 to 2012. Shaded values exceed the Manitoba Water Quality Standards, Objectives and Guidelines for the Protection of Aquatic Life	69
Table 5. 7	Total metal concentrations (mg/L) in Bernic Lake; 1975 and 2002 to 2012 (no data available for 1968 to 1970). Shaded values exceed the Manitoba Water Quality Standards, Objectives and Guidelines for the	72
Table 5. 8	Total metal concentrations (mg/L) in Tulabi Lake; 2005 to 2012. Shaded values exceed the Manitoba Water Quality Standards, Objectives and Guidelines for the Protection of Aquatic.....	76
Table 5. 9	Water quality in the Bird River at two stations upstream and downstream of the Bernic Creek inflow; October 2008. Units are mg/L. MWQSOG = Manitoba Water Quality Standards, Objectives and Guidelines.....	80
Table 5. 10	Sediment Quality For Bernic Lake Near-Field Sampling Stations October 2005 (n=10) and October 2008 (n=10). Values are mg/kg unless otherwise noted. Shaded and bolded values exceed	84
Table 5. 11	Sediment Quality For Tulabi Lake Sample Stations. October 2005 (n=10) and October 2008 (n=10). Values are mg/kg unless otherwise noted.....	85
Table 5. 12	Sediment chemistry in the Bird River at two stations, upstream and downstream of the Bernic Creek inflow; October 2008. Units are mg/kg unless otherwise noted. (Manitoba Water Quality Standard,.....	88
Table 5. 13	Summary of benthos statistics for the far-field and near-field (exposure) gradients sampled in Bernic Lake, October 2002, 2005 and 2008.....	89

Table 5. 14	Fish species know to occur in the Bird River Watershed and the TANCO project area.....	93
Table 5. 15	Catch per unit effort for fishes captured in the Bird River, October 1998 and August 2007.....	96
Table 5. 16	Municipalities in the regional study area.....	100
Table 5. 17	Labour force distribution by industry for municipalities in the regional study area (Statistics Canada 2006).	100
Table 5. 18	Five archaeological sites in the study area; UTM coordinates are in NAD83.....	104
Table 5. 19	Average annual and peak traffic volumes for PR 313and 315	105

LIST OF FIGURES

Figure 1.1	TANCO Mine Location Bernic, Manitoba	2
Figure 2.1	Surface Leases.....	12
Figure 2.2	Mineral Leases	13
Figure 2.3	General Site Plan of the TANCO Mine at Bernic Lake, Manitoba	14
Figure 2.4	Idealized Mine Cross Section Looking South West	16
Figure 2. 5	Proposed Temporary Access Road Alignment	26
Figure 2. 6	Location, Cross Section and Plan View of Temporary Dike	27
Figure 2. 7	Proposed Pipeline Alignment	30
Figure 3. 1	Bernic Lake Bathymetry Underground Mine Workings and Isolation Alternatives	35
Figure 4. 1	TANCO Mine Regional Study Area	40
Figure 4. 2	Local Study Area	41
Figure 5. 1	Hydrographic Features Associated with Bernic Lake Dewatering	46
Figure 5. 2	Range of the Owl-Flinstone Caribou Herd in Manitoba	48
Figure 5. 3	Watershed of Bernic Lake and the Bernic Lake Tributaries	50
Figure 5. 4	Bernic Lake, Manitoba – (1969 – 2012) Water Quality Sampling Stations.....	54
Figure 5. 5	Sample locations in Tulabli Lake	57
Figure 5. 6	Sample Locations in Bird River	82
Figure 5. 7	Documented Archaeological Sites Near the TANCO Mine.....	103