
TABLE OF CONTENTS

**CITY OF BRANDON'S WASTEWATER TREATMENT FACILITY
TO ACCOMMODATE MAPLE LEAF FOODS INC.'S PORK PROCESSING PLANT SECOND SHIFT,
BRANDON, MANITOBA**

ENVIRONMENTAL IMPACT ASSESSMENT

TABLE OF CONTENTS

SECTION	TITLE	PAGE NO.
EXECUTIVE SUMMARY		
GLOSSARY		
1.0	INTRODUCTION	1-1
1.1	Overview of the City of Brandon.....	1-1
1.2	Maple Leaf foods inc.	1-2
1.3	General Description	1-2
1.4	Regulatory Process	1-4
1.5	Site Selection Process	1-4
	References:	1-6
2.0	IWWTF SITE AND STUDY AREA DESCRIPTION.....	2-1
2.1	Study Area	2-2
2.2	General Physical and Environmental Setting	2-3
2.3	Geological Background	2-3
2.4	Climate.....	2-4
2.5	Vegetation, Soils; and, Wildlife.....	2-5
	2.5.1 Natural Vegetation: An Overview	2-5
	2.5.2 Wildlife: An Overview	2-7
	2.5.3 Soils of the Brandon/Assiniboine Valley Region	2-8
	2.5.3.1 Marringhurst Association.....	2-8
	2.5.3.2 Assiniboine Association.....	2-8
	2.5.3.3 Miniota Association	2-9
	2.5.3.4 Land Capability for Agriculture.....	2-9
2.6	Plant Site	2-10
2.7	Hydrology	2-10
	2.7.1 Site Drainage	2-10
	2.7.2 Assiniboine River	2-11
	2.7.2.1 Point and Non-Point Sources	2-13
	2.7.2.2 Withdrawals from the Assiniboine River.....	2-13
	2.7.2.3 Physicochemical Properties of Surface Water	2-14
	2.7.2.4 Surface Water Chemistry	2-14

TABLE OF CONTENTS (CONT'D)

SECTION	TITLE	PAGE NO.
2.0	IWWTF SITE AND STUDY AREA DESCRIPTION (continued)	
2.8	Aquatic Environment.....	2-16
2.8.1	Aquatic Biota.....	2-16
2.8.2	Invertebrates and Fish.....	2-18
2.8.2.1	Invertebrates.....	2-18
2.8.2.2	Fish Community.....	2-18
2.8.3	Aquatic Resource Utilization.....	2-19
2.8.3.1	Fisheries.....	2-19
2.8.2.1	Recreation.....	2-20
2.9	Hydrogeology.....	2-20
2.9.1	Site Hydrogeology.....	2-20
2.9.2	Ground Water Monitoring Program.....	2-21
2.9.2.1	1999 Ground Water Monitoring Program (Terraprobe, 1999).....	2-22
2.9.2.2	2000 Ground Water Monitoring Program (Terraprobe, 2000).....	2-23
2.9.2.3	2001 Ground Water Monitoring Program (Terraprobe, 2001).....	2-24
2.9.2.4	2002 Ground Water Monitoring Program (Terraprobe, 2002).....	2-25
2.9.3	Ground Water Flow to the Assiniboine River.....	2-27
2.10	Industrial Base.....	2-27
2.11	History, Geography; and, Services.....	2-27
2.12	Other Urban and Rural Settlements.....	2-29
2.13	Transportation.....	2-30
2.14	Cultural Setting.....	2-31
2.14.1	Heritage Resources.....	2-31
2.14.2	Aboriginal Peoples.....	2-32
2.14.3	Population Trends.....	2-32
2.14.4	Education.....	2-32
2.14.5	Agriculture.....	2-33
2.15	Three Kilometre Radius from Proposed Plant Site.....	2-34
2.16	Ten Kilometre Radius from Proposed Plant Site.....	2-35
	References.....	2-37
3.0	WASTE WATER PRETREATMENT PLANT.....	3-1
3.1	Existing Pretreatment Plant.....	3-1
3.2	Potential Pretreatment Improvements.....	3-2
3.2.1	Pump Station and Piping Modifications.....	3-3
3.2.2	Screening.....	3-3
3.2.3	Access to Elevated Screens, Centrifuge; and, Polymer Makeup Unit.....	3-3

TABLE OF CONTENTS (CONT'D)

SECTION	TITLE	PAGE NO.
3.0	WASTE WATER PRETREATMENT PLANT (continued)	
	3.2.4 Dissolved Air Flotation.....	3-3
	3.2.5 Skimmings Handling	3-4
	3.2.6 Pretreatment Sanitation.....	3-4
	3.2.7 Planned Additional Minor Changes to the Pretreatment System	3-5
	3.2.8 Effect of Changes to the Pretreatment Plant.....	3-5
4.0	EXPANDED INDUSTRIAL WASTE WATER TREATMENT FACILITY	4-1
4.1	Description of Existing IWWTF.....	4-1
	4.1.1 Covered Anaerobic Lagoon.....	4-1
	4.1.2 Activated Sludge System.....	4-2
	4.1.2.1 Anoxic Basin.....	4-2
	4.1.2.2 Aeration Basin.....	4-3
	4.1.2.3 Final Clarifier.....	4-3
	4.1.2.4 Sludge and Scum Handling.....	4-3
	4.1.3 Effluent Disinfection, Sampling, Metering; and, Discharge Facilities	4-4
4.2	Expanded Waste Water Treatment system.....	4-5
	4.2.1 Process Selection.....	4-5
	4.2.2 Pilot Project Testing.....	4-6
	4.2.3 System Integration Issues.....	4-8
	4.2.4 Expanded System Description and Method of Integration with the Existing IWWTF.....	4-9
	4.2.5 Membrane System Security.....	4-13
	4.2.6 Preliminary Design of New Equalization Basin.....	4-14
	4.2.7 Preliminary Design of Zenon Membrane System.....	4-15
	4.2.8 Effluent Sampling, Metering, Disinfection; and, Discharge Facilities.....	4-17
5.0	ENVIRONMENTAL IMPACT ASSESSMENT.....	5-1
5.1	Risk Analysis and Public Health Concepts.....	5-3
5.2	Potential Health Effects Associated with the Expanded IWWTF Emissions or Pretreatment Emissions.....	5-4
5.3	Air Quality Impacts.....	5-6
	5.3.1 Construction.....	5-6
	5.3.2 Operation Air Emission Sources.....	5-6
	5.3.3 Meteorology.....	5-7
	5.3.4 Background Concentrations of Air Quality Parameters.....	5-8
	5.3.5 Air Quality Impacts due to Expanded IWWTF.....	5-8
	5.3.6 Greenhouse Gases.....	5-9
	5.3.7 Noise.....	5-10
5.4	Potential Human Health Risks.....	5-10
	5.4.1 Potential Impacts of Air Emissions.....	5-10

TABLE OF CONTENTS (CONT'D)

SECTION	TITLE	PAGE NO.
5.0	ENVIRONMENTAL IMPACT ASSESSMENT (continued)	
5.5	Surface Water Impacts.....	5-11
	5.5.1 General.....	5-11
	5.5.2 Assiniboine River	5-12
	5.5.2.1 Winter Conditions.....	5-15
	5.5.2.2 Open Water.....	5-18
5.6	Subsurface Impacts.....	5-20
	5.6.1 Ground Water	5-20
5.6.2	Soils	5-21
5.7	Terrestrial Impacts	5-22
	5.7.1 Wildlife.....	5-22
	5.7.2 Vegetation.....	5-22
	5.7.3 Current Land Uses	5-23
5.8	Employment and Income.....	5-23
	5.8.1 Construction.....	5-23
	5.8.2 Operations.....	5-24
	5.8.3 Direct Employment.....	5-25
	5.8.4 Indirect and Induced Employment.....	5-25
	5.8.5 Local Purchasing Policy	5-25
	5.8.6 Overall Benefit.....	5-25
5.9	Population	5-26
5.10	Community Profile	5-26
	5.10.1 Background.....	5-26
	5.10.2 Community Profile	5-26
	5.10.3 Knowledge of and Attitudes Towards the Project.....	5-26
	5.10.4 Conclusions.....	5-28
5.11	Socioeconomic Impact.....	5-28
	5.11.1 Community Support.....	5-28
5.11.2	Employment Impact.....	5-28
5.12	Transportation.....	5-28
5.13	Heritage Impacts	5-29
5.14	Impacts on Local Land Use Planning Program	5-29
5.15	Summary of Environmental Impacts	5-29
	References:	5-31
6.0	MITIGATIVE MEASURES.....	6-1
6.1	Air Quality Impact Mitigation	6-1
	6.1.1 Introduction.....	6-1
	6.1.2 Air Emissions.....	6-1
	6.1.3 Meteorology.....	6-2
	6.1.4 Mitigation of Air Quality Impacts Due to the Expanded Industrial Wastewater Treatment Facility.....	6-2
	6.1.5 Mitigation of Greenhouse Gas Emissions.....	6-2
	6.1.6 Noise Abatement	6-3

TABLE OF CONTENTS (CONT'D)

SECTION	TITLE	PAGE NO.
6.0	MITIGATIVE MEASURES (continued)	
6.2	Human Health Risk Mitigation.....	6-4
	6.2.1 Worker Health and Safety.....	6-4
	6.2.2 Mitigation of Airborne Emission Impacts to Human Health...	6-4
6.3	Surface Water Impact Mitigation.....	6-5
	6.3.1 On-site Drainage System	6-5
	6.3.2 Assiniboine River Drainage System	6-5
6.4	Subsurface Impact Mitigation.....	6-6
	6.4.1 Ground Water Impact Mitigation	6-6
	6.4.2 Soil Impact Mitigation	6-7
6.5	Terrestrial Impact Mitigation.....	6-8
	6.5.1 Mitigation of Impacts on Wildlife	6-8
	6.5.2 Mitigation of Impacts to Vegetation.....	6-9
	6.5.3 Mitigation of Impacts on Current Land Uses	6-9
6.6	Mitigation of Population Impacts	6-9
6.7	Community Support.....	6-10
6.8	Employment Impact Mitigation.....	6-10
6.9	Mitigation of Ozone Depleting Substance (ODS) Impacts.....	6-10
6.11	Socio-Economic Impacts	6-10
6.12	Waste Generation Mitigation.....	6-11
7.0	CONTINGENCY PLANS AND BIOSOLIDS MANAGEMENT PROGRAM	7-1
7.1	Process Upset.....	7-2
7.2	Pollution Control Equipment	7-3
7.3	Fire.....	7-4
7.4	Accidents	7-4
	7.4.1 Spills	7-4
	7.4.2 Accident Prevention.....	7-6
	7.4.3 Transportation.....	7-7
7.5	Emergency Response and Environmental Management Systems	7-8
	7.5.1 Emergency Response.....	7-8
	7.5.2 Environmental Management Systems	7-8
7.6	Biosolids Management Program.....	7-9
8.0	MONITORING.....	8-1
8.1	Surface Water	8-1
	8.1.1 Storm Water Runoff	8-1
	8.1.2 Assiniboine River	8-1
8.2	Ground Water	8-3
8.3	City of Brandon Water Supply to Plant	8-4
8.4	Point Source Air Emissions Testing	8-5
8.5	Background Ambient Air Quality Testing.....	8-5
	References.....	8-8

TABLE OF CONTENTS (CONT'D)

SECTION	TITLE	PAGE NO.
9.0	PLANT DECOMMISSIONING.....	9-1
0.0	SUSTAINABLE DEVELOPMENT STRATEGY	10-1
10.1	Principles Of Sustainable Development	10-1
10.2	Fundamental Guidelines of Sustainable Development	10-4
11.0	PUBLIC PARTICIPATION.....	11-1
11.1	History of Publicized Information	11-1
11.2	Second-Shift Public Consultation.....	11-9
11.3	Open Houses.....	11-11

LIST OF TABLES

Table 2.1:	Monthly Temperatures and Precipitation – Brandon.....	2-4
Table 2.2:	Rare Plants Within the Vicinity of the IWWTF Site	2-6
Table 2.3:	Minimum and Median Flows for Assiniboine River based on Present Regulated Flows at Brandon	2-12
Table 2.4:	1996 Population of Some Towns and Municipalities Near Brandon.....	2-30
Table 2.5:	Residents and Businesses Near the Maple Leaf Pork Site.....	2-34 and 2-35
Table 4.1:	Waste Water Pre-treatment Effluent/Waste Water Treatment Influent Design Parameters	4-1
Table 4.2:	Typical Single-Shift IWWTF Effluent Quality	4-4
Table 5.1:	Explanation of Terms Used in Impact Assessment	5-2
Table 5.2:	Contacts at Provincial, State and Federal Agencies With Respect to Air Emissions from Pork Processing Plants.....	5-5
Table 5.3:	Ambient Air Quality Data for Brandon, Manitoba	5-8
Table 5.4:	Estimated Construction Labour Force by Month.....	5-24
Table 5.5:	Summary of Environmental Impacts (Construction).....	Following 5-31
Table 5.6:	Summary of Environmental Impacts (Operation).....	Following Table 5-5
Table 6.1:	Explanation of Terms Used in Impact Assessment	6-2
Table 6.2:	Contacts at Provincial, State and Federal Agencies With Respect to Air Emissions from Wastewater Treatment Facilities	6-5
Table 6.3:	Ambient Air Quality Data for Brandon, Manitoba	6-10
Table 6.4:	Estimated Labour Force by Month	6-19
Table 6.5:	Summary Economic Report for Maple Leaf Project in Brandon.....	6-20 to 6-21
Table 6.6:	Total Population Increase in Brandon Region Compared to 1997 Data	6-22
Table 6.7:	Total Population Increase in the City of Brandon.....	6-23
Table 6.8:	Average Daily One-Shift Actual Traffic and Two-Shift Estimated Traffic	6-26
Table 6.9:	Summary of Environmental Impacts (Construction).....	6-28 to 6-31
Table 6.10:	Summary of Environmental Impacts (Operation).....	6-32 to 6-35
Table 7.1	Preliminary Sites Identified for Potential Sludge Application within the Annulus of 15-km and 25-km Radius of the City of Brandon’s IWWTF	7-11
Table 8.1	Water Analysis - City of Brandon	8-5
Table 8.2	Average Ambient Air Quality Data for Brandon, Manitoba	8-6
Table 8.3	Post-Maple Leaf Pork Air Quality Data for Brandon, Manitoba.....	8-7

TABLE OF CONTENTS (CONT'D)

SECTION	TITLE	PAGE NO.
LIST OF FIGURES		
Figure 1.1	Location Plan of The City of Brandon Expanded IWWTF	Following 1-2
Figure 2.1	Site Plan of The City of Brandon Expanded IWWTF	Following 2-1
Figure 2.2	Site Plan of Expanded Maple Leaf Pork Plant and The Expanded City of Brandon IWWTF	Following Figure 2.1
Figure 2.3	Detailed Site Plan of The City of Brandon Expanded IWWTF	Following Figure 2.2
Figure 2.4	Zoning of Properties Neighbouring The City of Brandon Expanded IWWTF	Following 2-2
Figure 2.5	10 km Radius From The City of Brandon Expanded IWWTF	Following Figure 2-4
Figure 2.6	Residents Situated Within 3 km of The City of Brandon Expanded IWWTF	Following 2-3
Figure 2.7	Relief Map of The Brandon Region.....	Following Figure 2-6
Figure 2.8	Surficial Geology Within 3 km of The City of Brandon Expanded IWWTF	Following Figure 2-7
Figure 2.9	Annual Wind Rose Brandon, Manitoba – 1958 to 1982.....	Following 2-4
Figure 2.10	Winter Wind Rose (Nov – Apr) Brandon, Manitoba – 1958 to 1982	Following Figure 2.9
Figure 2.11	Summer Wind Rose (May – Oct) Brandon, Manitoba – 1958 to 1982	Following Figure 2.10
Figure 2.12	Vegetation Within 3 km of The City of Brandon Expanded IWWTF.....	Following 2-5
Figure 2.13	Land Ungulate Capability Within 3 km of The City of Brandon Expanded IWWTF	Following 2-7
Figure 2.14	Waterfowl Capability Within 3 km of The City of Brandon Expanded IWWTF	Following Figure 2.13
Figure 2.15	Soil Associations Within 3 km of The City of Brandon Expanded IWWTF	Following 2-8
Figure 2.16	Land Agricultural Capability Within 3 km of The City of Brandon Expanded IWWTF	Following 2-9
Figure 2.17	Typical Drainage Patterns Near The City of Brandon Expanded IWWTF	Following 2-10
Figure 2.18	City of Brandon IWWTF Existing Site Drainage.....	Following 2-11
Figure 2.19	General Site Drainage at The City of Brandon Expanded IWWTF	Following Figure 2.18
Figure 2.20	Assiniboine River Drainage Basin.....	Following Figure 2.19
Figure 2.21a	Wells Within Approximately 3km of the Expanded City of Brandon IWWTF	Following 2-20
Figure 2.21b	Groundwater Monitoring Wells Located at Maple Leaf Pork and The City of Brandon IWWTF.....	Following 2-23
Figure 2.22	Commuter Traffic Traveling to The City of Brandon Expanded IWWTF	Following 2-30
Figure 2.23	Education Training Levels In Brandon.....	Following 2-33
Figure 3.1	Process Flow Diagram For Maple Leaf Pork Existing Pre-Treatment System	Following 3-1
Figure 4.1	General Arrangement of The Existing City of Brandon IWWTF	Following 4-2
Figure 4.2	Schematic of Pilot Test Facility Maple Leaf Pork Brandon, Manitoba.....	Following 4-8
Figure 4.3	General Arrangement of The City of Brandon Expanded IWWTF	Following 4-11
Figure 4.4	Process Flow Diagram of The City of Brandon Expanded IWWTF Equalization Basin.....	Following Figure 4.3

TABLE OF CONTENTS (CONT'D)

SECTION	TITLE	PAGE NO.
LIST OF FIGURES (continued)		
Figure 4.5	Process Flow Diagram of The Zenon System at The City of Brandon Expanded IWWTF	Following Figure 4.4
Figure 4.6	Process Flow Diagram of The Existing UV Disinfection System at The City of Brandon Expanded IWWTF	Following Figure 4.5
Figure 4.7	Mass Balance of The City of Brandon Expanded IWWTF	Following Figure 4.6
Figure 4.8	General Details of the Equalization Basin at The City of Brandon Expanded IWWTF	Following 4-16
Figure 4.9	General Layout of the Treatment Tanks of The City of Brandon Expanded IWWTF	Following 4-17
Figure 4.10	General Layout of the Equipment Building of The City of Brandon Expanded IWWTF	Following Figure 4.9
Figure 4.11	Hydraulic Profile for the Existing Anaerobic Lagoon at The City of Brandon IWWTF	Following 4-18
Figure 4.12	Hydraulic Profile for the Existing Treatment Train at The City of Brandon IWWTF	Following Figure 4.11
Figure 4.13	Hydraulic Profile Through the Equalization Basin of The City of Brandon Expanded IWWTF	Following Figure 4.12
Figure 4.14	Hydraulic Profile Through the Zenon Treatment System of The City of Brandon Expanded IWWTF	Following Figure 4.13
Figure 5.1	Schematic Drawing of Properties Adjacent to The City of Brandon Expanded IWWTF	Following 5-23
Figure 5.2	Preliminary Construction Schedule	Following 5-24
Figure 7.1	Distribution of Lands Within 25 km of The City of Brandon Expanded IWWTF Identified as Suitable for Biosolids Application	Following 7-9

LIST OF APPENDICES

- Appendix A: Provincial Water Quality Data
- Appendix B: Zenon Design and Pilot Report