City of Brandon, Manitoba

Notice of Alteration to the City of Brandon's Wastewater Treatment Facility 2003 Environment Act Proposal, Brandon, Manitoba

Prepared for:
City of Brandon

Prepared by:
Earth Tech (Canada) Inc.
850 Pembina Highway
Winnipeg, Manitoba R3M 2M7

November, 2006

Project No. 97085

Letter of Transmittal

CITY OF BRANDON
ENGINEERING DEPARTMENT
City Hall – 410 – 9th Street, Brandon, MB R7A 6A2
Phone: 729-2214 Fax: 725-3235

November 1, 2006

Ms. Tracey Braun, M.Sc.
Director, Environmental Assessment & Licensing Branch
Manitoba Conservation
123 Main Street, Suite 160
Winnipeg MB R3C 1A5

Subject: NOTICE OF ALTERATION TO CITY OF BRANDON'S INDUSTRIAL WASTEWATER TREATMENT FACILITY 2003 ENVIRONMENT ACT PROPOSAL
BRANDON, MANITOBA

Dear Ms. Braun:

On behalf of the City of Brandon, please find enclosed two copies of a Notice of Alteration (NOA) for the City's Industrial Wastewater Treatment Facility 2003 Environment Act proposal in accordance with Section 14(1) of The Environment Act.

The alterations requested are mainly related to the interim treatment processes and equipment required for a two phased approach towards the development of a Centralized Wastewater Treatment Facility for the City of Brandon. The attached NOA concerns only Phase I of this process; a second NOA will be submitted in 2007 for the more complex Phase II where several wastewater streams will be combined and treated. Phase II will result in additional treatment for not only the existing IWWTF effluent from Maple Leaf Foods but also the municipal wastewater generated by the City of Brandon, Wyeth Organics, and possibly septage as well. All of the Phase I alteration work will be undertaken on the City of Brandon's property that currently includes the existing IWWTF and will maximize the use of existing infrastructure while additional infrastructure, as proposed, has been designed for the ability to compliment and match the anticipated Phase II project.

The environmental effects of the proposed Phase I alterations have been assessed and comparisons to the previous 2003 proposal and the existing IWWTF facility's operation have been provided. All of the environmental effects

have been indicated to either be an improvement or present a nil to low effect compared to these two cases. The 2003 proposal was the subject of CEC hearings and each of the resulting recommendations are addressed in the attached package. In particular, this alteration would result in an interim immediate reduction of nutrients discharged to the Assiniboine River upon completion of the Phase I expansion, and will in fact facilitate a further reduction when Phase II is complete in 2009.

We believe that the requested alterations can be considered minor in nature. The proposed Phase I alterations will mitigate existing negative environmental effects associated with the existing plant and therefore the potential negative environmental effects associated with the alterations would be considered insignificant as referred to in the Environment Act Section 14(2)

The City of Brandon would like to have the ability to install building footings and foundations in the fall of 2006 prior to the onset of adverse winter weather conditions. Accordingly, the City of Brandon would request an early consideration and approval of this NOA, or a staged approval, for the building footings and foundations.

Should you require any further information or clarification on this NOA, please do not hesitate to contact my office at 729-2214 or Stephen Biswanger at Earth Tech at 478-8567.

Very yours,

Ian Christianson P.Eng

for Ted Snure P.Eng

General Manager Development Services

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Introduction

SECTION 1.0
INTRODUCTION

This Notice of Alteration (NOA) includes the necessary alterations to the 2003 Proposal (Manitoba Environment Act Form and Supporting Documentation for an Operating License for the City of Brandon's Expanded Industrial Wastewater Treatment Facility (IWWTF) for Maple Leaf Pork's Second Shift, Brandon, Manitoba, March 2003) submitted to Manitoba Conservation for the alteration and operation of an expanded IWWTF referred to herein as Phase I.

1.1 BACKGROUND

In 2003 a proposal under the Manitoba Environment Act was submitted to expand the City of Brandon's Industrial Wastewater Treatment Facility (IWWTF) that was constructed in 1999 to facilitate a second shift at Maple Leaf Foods to process a maximum of 108,000 hogs/week. Maple Leaf Foods also filed a Notice of Alteration (NOA) for operational improvements to their systems to more efficiently facilitate a second shift. A complete list of the reports and studies completed in support of the proposal are available on the Province's Public Registry website at the following internet address:

http://www.gov.mb.ca/conservation/envapprovals/registries/brandonwastewater/index.html

In summary, the 2003-proposed wastewater treatment configuration combined the existing biological system with an expanded biological and innovative membrane system capable of removing a larger percentage of nutrients to allow Maple Leaf Foods to begin a second shift at their processing facility while reducing the amount of nutrients discharged to the Assiniboine River. The Maple Leaf pork processing plant is licensed to operate 2 shifts but is bound by capacity of the IWWTF to treat the wastewater prior to discharge to the Assiniboine River. The proposed 2003 IWWTF expansion consisted of a new equalization basin, a pre-denitrification step to augment the existing treatment process, ferric chloride dosing to remove phosphorous, and a new Zenon membrane system connected in series, but paralleling the existing biological treatment system to replace the existing clarifiers at the IWWTF.

Overall, the environmental impacts related to the construction of the expanded IWWTF were anticipated to be low to moderate in magnitude and largely manageable and mitigatible. The overall environmental impacts related to the operation of the expanded IWWTF were anticipated to be manageable and centered on the Assiniboine River.

The Manitoba Minister of Conservation referred the Maple Leaf Foods and City of Brandon proposals to the Manitoba Clean Environment Commission (CEC). The Commission conducted hearings in Brandon on June 25, 26 and 27, 2003 and on July 15 and 16, 2003 and produced a report that presented their findings and recommendations. The Clean Environment Commission's Report is available at the following internet address:

http://www.cecmanitoba.ca/Reports/PDF/Brandon_Maple_Leaf_Report1.pdf

As outlined in the CEC's report (CEC, 2003), the Commission concluded that the expanded wastewater treatment plant would not likely result in significant additional environmental impacts and that the proposed expansion could reduce nutrient levels lower than required to meet Manitoba Conservation's "no net increase" criteria. However, the CEC recommended that the terms of the licence should reflect the lower nutrient concentrations attained during pilot testing.

Since the conclusion of the hearings and publication of the Commission's report in October 2003 there have been some discussions between the Province, the City of Brandon, and Maple Leaf Foods regarding amendments to their perspective operating licences. However, the operating licences for the City's IWWTF and Maple Leaf Foods have not been amended and no expansion has been carried out at either of the facilities.

1.2 MANITOBA CLEAN ENVIRONMENT COMMISSION RECOMMENDATIONS

In total, the CEC outlined 13 recommendations in their report on the 2003 hearings. Of these recommendations four (4) directly applied to the City of Brandon IWWTF, five (5) to both the City of Brandon and Maple Leaf Foods, and four (4) were more generic or broader in scope (eg. Directed to Manitoba Conservation or applied to the hog industry, etc.). In light of the 2003 proposal and the recommendations applicable to the IWWTF, the City of Brandon has considered the recommendations and has structured this alteration request to address the CEC recommendations and in addition, has identified additional mitigation measures required to address incremental changes in the proposed system compared to the 2003 proposal. In this way the City of Brandon can ensure that the environmental effects from the now-proposed facility will be minor in nature and will satisfy the applicable requirements of the CEC. Each of the CEC recommendations are directly addressed in Section 4 of this document.

1.3 PHASED APPROACH TO CENTRALIZED WASTEWATER TREATMENT FACILITY

It is the intention of the City of Brandon to develop a Centralized Wastewater Treatment Facility (CWWTF) that will treat the wastewater from the City of Brandon, Maple Leaf Foods and Wyeth Organics. Completion of the CWWTF will reduce the nutrient loads to the River from three of the City's major sources fulfilling the City's goal of meeting the Province's water quality objectives resulting in better water quality in the Assiniboine River and in Lake Winnipeg. It is important to note that the completed CWWTF will result in a benefit to the Assiniboine River that would exceed not only the proposal of 2003, but also the subsequent recommendations of the CEC for the IWWTF. When completed, the CWWTF (to be constructed in two phases) will reduce the nutrient content of the Assiniboine River and Lake Winnipeg.

A two phased approach to construction of the CWWTF is proposed to accomplish a number of goals which are practical in nature, benefiting both private industry and the public utility, while also serving to develop the City's ability to improve its wastewater treatment towards a

goal consistent with the current policy of the Government of Manitoba. The first phase, termed Phase I, includes the following operational goals:

- Improvement of the treatment system at the IWWTF to allow Maple Leaf Foods to increase production from the current licenced 54,000 hogs per week to 75,000 hogs per week until Phase II of the CWWTF is completed
- Development of the skills and experience of the IWWTF operators to gradually manipulate the operation of the CWWTF from the existing organics reduction focus, towards a more nutrient driven goal of 15 mg TN/L and 1 mg TP/L when Phase II is complete
- Achievement of immediate improvement in effluent quality while also facilitating the development of an overall plan that will result in meeting the recommendations of the CEC within an estimated three years and facilitating an even further improvement in effluent quality from other sources in the area

Phase I of the CWWTF will allow Maple Leaf Foods to increase production to 75,000 hogs/week with limited expansion of the existing IWWTF. The Phase I expansion of the IWWTF will maximize practical economies of scale through sound design and planning in the transition towards Phase II while minimizing the use and/or construction of infrastructure that would be rendered useless when the full CWWTF is completed in Phase II. In Phase I of the project, the City of Brandon proposes to achieve 65 mg TN/L, which represents a reduction of 37% from the current annual average concentration of 103 mg TN/L over 2004 and 2005. This concentration represents a "no net increase" approach to total nitrogen load, and is proposed as an interim step until the centralized treatment plant is completed in 2009. Upon completion, Phase I would also result in a reduction of phosphorus in the effluent by 94% to 1 mg/L. Overall, Phase I represents a financially viable method of reducing nutrients discharged to the Assiniboine River in the short term while allowing a partial expansion of the Maple Leaf operational capability. In fact, by proceeding with Phase I as soon as possible, as much as 23 tonnes of phosphorus per year would be removed from effluent discharged to the Assiniboine River (based upon full 75,000 hog/week production at 1 mg TP/L vs. existing 50,000 hog/week production at 16.1 mg TP/L).

Phase II would achieve the Province's objective of reducing nutrient loads discharged to the Assiniboine River to 15 mg/L of total nitrogen and 1 mg/L of total phosphorus. Phase II will also allow the full expansion of Maple Leaf's operations (to 108,000 hogs/wk) and achievement of 15 mg TN/L and 1 mg TP/L.

Further to improving the IWWTF effluent quality for Phase I, the City of Brandon is hereby requesting timely approval of this NOA to allow construction to begin on Phase I in 2006. Alternatively, approval to conduct foundation preparations as soon as possible in the fall of 2006 as part of a staged approval is respectfully requested.

1.4 NOA DOCUMENT STRUCTURE

Section 2 of this NOA document describes the amendments to the 2003 Proposal required to construct and operate Phase I of the CWWTF including a brief summary of the proposed future Phase II CWWTF concept. In conjunction with this NOA, Maple Leaf Foods will be filing a NOA for the upgrades to their facilities that are required for Phase I to operate satisfactorily. The City of Brandon will file another NOA in early 2007 that will include the required changes to their municipal and industrial wastewater and treatment facilities to develop Phase II of the CWWTF.

Section 3 of this document assesses the environmental impacts from Phase I and outlines the mitigative measures taken to reduce the project's environmental impact where they differ from the 2003 proposal.

Section 4 of this document summarizes the applicable CEC recommendations and the methods and measures taken/proposed in this NOA to directly address those recommendations.

Section 5 of this document provides an overall summary of this NOA and concluding remarks.

Section 2.0
Notice of Alteration

SECTION 2.0
NOTICE OF ALTERATION

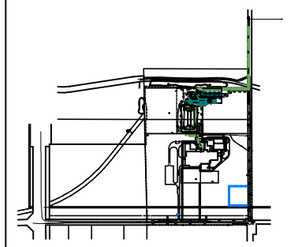
2.1 PHASE I CWWTF PROJECT DESCRIPTION

As discussed in Section 1, the City of Brandon is proposing to expand its wastewater treatment in a two-phase approach. Phase I will be an interim expansion of their Industrial Wastewater Treatment Facility (IWWTF) allowing Maple Leaf Foods to increase processing capabilities at its facility to 75,000 hogs/week prior to the completion of Phase II, a Centralized Wastewater Treatment Facility (CWWTF). The physical differences between these phases are illustrated in Figure 2.1.

The proposed completion date for Phase I is June 30, 2007 to coincide with Maple Leaf Foods' scheduled ramp up of production. Following the completion of the interim expansion of the IWWTF (Phase I), the City will continue preparations for Phase II plant upgrades at the IWWTF and the Municipal Wastewater Treatment Facility (MWWTF) with the final project consisting of a Phase II CWWTF treating the City's municipal influent, Maple Leaf Foods industrial effluent, septage, and Wyeth Organic's industrial effluent. The completion of Phase II is anticipated to be in 2009

The scope of this Notice of Alteration (NOA) includes the necessary alterations to the 2003 Proposal (Manitoba Environment Act Form and Supporting Documentation for an Operating Licence for the City of Brandon's Expanded Industrial Wastewater Treatment Facility for Maple Leaf Pork's Second Shift, Brandon, Manitoba) submitted to Manitoba Conservation for the alteration and operation of an expanded IWWTF referred to herein as Phase I. An additional NOA is anticipated to be filed in 2007 for the alterations required to further develop the presently proposed Phase I development into the overall Phase II CWWTF.

A summary of the primary differences between the currently existing IWWTF operation (non altered), the 2003 proposed alterations to the IWWTF, and the now proposed Phase I is provided in Table 2.1.



EXISTING 54,000 hogs/week

PHASE I 75,000 hogs/week

PHASE II 108,000 hogs/week + Brandon Municipal + Septage

B.M. ELEV.

NO.	REVISIONS	DATE	BY

Earth Tech
A Tyco International Ltd. Company

DESIGNED BY	KS	CHECKED BY	
DRAWN BY	SRP	APPROVED BY	
SCALE:	1:500	RELEASED FOR CONSTRUCTION BY:	
DATE	2006/08/21	DATE	

ENGINEER'S SEAL

PRELIMINARY
NOT FOR CONSTRUCTION

CONSULTANT DRAWING NO.
GC1.02

THE CITY OF BRANDON

PHASE I INDUSTRIAL WASTEWATER TREATMENT FACILITY UPGRADE

FIGURE 2.1 – SITE PLAN

CITY FILE NUMBER

SHEET OF

CITY DRAWING NUMBER

PN 97085

Last Save: 2006-11-03 10:55 AM

L:\GROUP\ENV\MARKETING\PROJECTS\BRANDON PHASE I 2006\DRAFT NOA REPORT\FIG 2.1 GC1.02.DWG

Table 2.1: Summary Comparison of Physical Differences Betweenthe Present IWWTF Operation, 2003 Proposed Alteration,and Phase I Proposed Alteration (Differences Highlighted)

Item or Process	Present Operation	2003 Proposed Alteration	Phase I Alteration to 2003 Proposal
Anaerobic Basin	Double HDPE lined with leak detection and insulated HDPE cover for anaerobic treatment of pretreated Maple Leaf process wastewater and sanitary effluent.	Maintain anaerobic basin but combine anaerobic effluent with bypassed effluent via a parallel equalization basin prior to discharge to the existing anoxic/aerobic reactor and a parallel Zenon membrane treatment reactor system incorporating pre and post denitrification with chemical dosing to augment P removal. The two streams would then be blended and disinfected via an expanded UV treatment system prior to discharge to the Assiniboine River.	Same as existing system with basic expansion of existing processes. No additional equalization basin or membrane reactor system or process equipment related to the Zenon process. Existing UV will still be expanded, clarifier will still be used, and existing outfall will still be used.
Influent flow:	Approximately 30,310 m^3/week under single shift (50,000 hogs/wk)	51,639 m^3/week (process and sanitary) under two shift (108,000 hogs/wk, 6 day kill week)	39,550 m^3/week (process and sanitary) under two shift (75,000 hogs/wk, 5 day kill week)
Biosolids storage volume:	Approximately 15,000 m^3 in anaerobic basin	25664.6 m^3 in anaerobic basin Excess in City of Brandon Lagoons if necessary	15,000 m^3 in anaerobic basin Excess 10,000 m^3 in City of Brandon Lagoons in 2008.
Available flow equalization volume:	12,600 m^3 in anaerobic basin	12,600 m^3 in anaerobic basin Additional 4900 m^3 in proposed equalization basin	12,600 m^3 in anaerobic basin. No additional equalization basin required.

Item or Process	Present Operation	2003 Proposed Alteration	Phase I Alteration to 2003 Proposal
Anoxic/Aerobic Reactor	Partially subsurface concrete tanks.	Existing partially subsurface concrete tanks. Additional tanks added for Zenon system. Zenon system includes two pre-denitrification tanks, two bioreactors and two post-denitrification tanks.	Existing partially subsurface concrete tanks. Additional anoxic/aerobic reactor added, sized to match as an integral component of the Phase II CWWTF No Zenon system installed for Phase I.
Anoxic treatment volume:	1152 m^3 in existing bioreactor.	1152 m^3 in existing bioreactor. Additional volume in pre-anoxic tanks of parallel system	1152 m^3 in existing bioreactor. Additional 1872 m^3 in additional bioreactor. Additional 720 m^3 expansion on existing reactors. (Total Phase I pre-anoxic volume is 3,744 m^3).
Aeration cell:	3456 m^3 in existing bioreactor with aeration provided by 3 surface aerators	3456 m^3 in existing bioreactor Additional volume in parallel system	3456 m^3 in existing bioreactor Additional 3456 m^3 in additional bioreactor.with submerged fine bubble aeration system
Clarifier	22.5 m diameter, 4.5 m deep clarifier with skimmer and scraper	22.5 m diameter, 4.5 m deep clarifier with skimmer and scraper to treat 2,077 m^3/day Membrane filtration provided to treat 5,300 m^3/day	Same as existing No membrane filtration

Item or Process	Present Operation	2003 Proposed Alteration	Phase I Alteration to 2003 Proposal
UV Effluent Disinfection	Four arm Trojan 3000 system with expansion possible Ability to treat up to 4.6 ML/d	Expansion of original four arm Trojan 3000 system with two additional arms and removal of baffle in UV chamber to treat 7.3 ML/d	Same as 2003 proposal Need to treat 5.65 ML/D
Discharge to Assiniboine River	Discharge via 375 mm diameter outfall to the Assiniboine River.	Discharge via 375 mm diameter outfall to the Assiniboine River.	Same as existing
Chemical Dosing	Lime for pH control	Same with Ferric Chloride for phosphorus precipitation and provision for methanol addition to aid in denitrification as necessary. Sodium hydroxide and citrate were also proposed as part of membrane maintenance.	Lime as well as liquid pH adjustment chemical to supplement alkalinity and provide redundancy to lime addition. No NaOH or citrate required for membrane maintenance. Phosphorus precipitation chemical such as alum or ferric chloride, etc. to be added. Methanol/ethanol to be permanently added to improve denitrification.

2.1.1 Phase I Influent Design Parameters

The 2003 Proposal was to expand the IWWTF to accommodate Maple Leaf Foods expansion and increased production to approximately 108,000 hogs/week. It is now proposed that Phase I be developed to accommodate wastewater effluent from processing 75,000 hogs/week, a 30% decrease from the 2003 proposal, but a 39% increase from the existing operation that is currently licensed to process approximately 54,000 hogs/week (although current 2005-2006 production is approximately 50,000 hogs/week).

Presently process wastewater generated at the Maple Leaf facility is conveyed to three externally fed 1.0 mm screens prior to flowing into three dissolved air flotation tanks (DAFs). After the DAFs the wastewater flows by gravity to a wet well where it is pumped to the anaerobic basin located at the City of Brandon IWWTF. Sanitary wastewater from the Maple Leaf facility is pumped separately from the processing facility, through a single 6 mm screen and directly into the anaerobic basin.

Concurrent with this NOA, Maple Leaf is filing a notice of alteration under separate cover to upgrade the pre-treatment facility with the ability to add chemical treatment (such as ferric chloride, a tripolymer, or similar purpose chemical or an acidulation method) to one of the DAFs to enhance BOD, TSS, nitrogen and phosphorus removal prior to discharging to the City of Brandon's Phase I CWWTF. The rationale for enhancing the pre-treatment system is to enable the CWWTF to achieve the stated reduction in effluent nutrient content (see Section 1.3). The amount of chemical addition in the pre-treatment system is determined, in part, recognizing that chemically pre-treating the wastewater will result in significant quantities of sludge that cannot be rendered or land applied, and thus must be landfilled or composted. The need for chemical pre-treatment at Maple Leaf Foods will be re-evaluated in the design of the Phase II expansion.

HDR Engineering provided the expected DAF effluent and the sanitary wastewater characteristics for the 75,000 hog/wk production as listed in Tables 2.2 and 2.3 on behalf of Maple Leaf Foods.

Table 2.2: Projected 75,000 hog/wk Process Flows and Loads (Provided by HDR Engineering July 18, 2006)

Parameter	75,000 hogs/day (5 day kill wk) – (Chemically Pre-Treated)
Flow	
Weekly Maximum	38,250 m^3/wk
Daily Maximum	7,676 m^3/d
$CBOD_5$	
Weekly Average	39,688 kg/wk (1038 mg/L)
Daily Maximum	8,922 kg/d (1162 mg/L)
COD	
Weekly Average	82,944 kg/wk (2168 mg/L)
Daily Maximum	17,543 kg/d (2286 mg/L)
TSS	
Weekly Average	21,775 kg/wk (569 mg/L)
Daily Maximum	4,525 kg/d (590 mg/L)
TKN	
Weekly Average	8,089 kg/wk (211 mg/L)
Daily Maximum	1,686 kg/d (220 mg/L)
Oil and Grease	
Weekly Average	13,383 kg/wk (350 mg/L)
Daily Maximum	2,162 kg/d (282 mg/L)
Total Phosphorus	
Weekly Average	1,020 kg/wk (26.7 mg/L)
Daily Maximum	193 kg/d (25 mg/L)

Table 2.3: Projected 75,000 hog/wk Sanitary Wastewater Flows and Loads (Provided by HDR Engineering July 18, 2006)

Parameter	Sanitary Wastewater Production for 75,000 hogs/wk
Flow	
Non Kill Days	25.0 m^3/d
Kill Day Average	207 m^3/d
Peak Hourly	1.1 m^3/min
Instantaneous Peak	1.65 m^3/min
Constituents	
$CBOD_5$	
Concentration	480 mg/L
Load	100 kg/d
TSS	
Concentration	480 mg/L
Load	100 kg/d
TKN	
Concentration	32 mg/L
Load	6.6 kg/d
TP	
Concentration	12 mg/L
Load	2.5 kg/d

Presently both the Maple Leaf Licence and the City of Brandon IWWTF Licence 2367 S2R specify influent quality and load limits as well as a minimum anaerobic basin temperature of 28ºC. The limits are specified under Clauses 6 and 8 in the City of Brandon Licence.

The City of Brandon requests that the specific influent pollutant loadings and flow limits governing influent from the Maple Leaf pre-treatment system be removed from the licence as part of the alteration. Instead, the influent quality and loading rates would be governed through a separate industrial use agreement between the City of Brandon and Maple Leaf Foods which will allow flexibility to modify operation of the Phase I CWWTF towards a focus on nutrient removal in addition to the existing parameters. Alternatively, the parameters

outlined in Tables 2.2 and 2.3 above would be acceptable replacements for the information in Clause 8.

With respect to the anaerobic basin minimum temperature requirement of 28ºC in Clause 6, the City of Brandon would request that the limit be reduced to 25ºC to provide the flexibility to adjust the CWWTF operations in attempts to further optimize the processes for nutrient removal if determined to be applicable or necessary. The temperature requirements above 25ºC would be directed by the City of Brandon through their agreement with Maple Leaf Foods in the existing "Agreement for Exchange of Energy" or through a separate Industrial Use Agreement with Maple Leaf Foods.

In each of the above requests performance would be monitored and changes would be made to the governing agreements (the industrial use agreement and/or the agreement for exchange of energy) from time to time between the City of Brandon and Maple Leaf Foods. This would be done to ensure continued effluent compliance, to improve effluent quality, and reduce overall costs and energy consumption. It is understood that no matter what changes are undertaken in terms of operation of the Phase I CWWTF, that it is the City of Brandon's responsibility to comply with the terms of the licence.

2.1.2 Phase I Effluent Design Parameters

With respect to the existing IWWTF, limits exist on the amount of biochemical oxygen demand (BOD), suspended solids, ammonia, total coliform, and fecal coliform contained in the effluent. These limits are stipulated in the Environment Act Licence No. 2367 S2 R granted in 2002 to the City of Brandon. The CEC recommended the addition of total nitrogen (TN) and total phosphorus (TP) discharge limits in their report on the CEC hearings conducted for the 2003 proposed alteration to the City of Brandon IWWTF.

In terms of the effluent from the proposed CWWTF, the treatment plant is proposed to be constructed in two phases, with each phase meeting increasingly stringent effluent criteria.

- In Phase 1, the facility will be expanded to accommodate the flows and loads produced by a 75,000 hog per week operation at the Maple Leaf facility. This will involve construction of a second activated sludge basin, chemical dosing, and expansion of the UV Disinfection Facility. The infrastructure from Phase I has been designed to mate with the foreseen Phase II expansion infrastructure to the extent possible. The effluent parameters include a total nitrogen concentration of 65 mg/L and a total phosphorus concentration of 1 mg/L.

- In Phase II, Phase I will be expanded and upgraded to accommodate the flows and loads produced by a 108,000 hog per week operation at Maple Leaf, the full City of Brandon municipal wastewater flow, Wyeth Organics flow, and septage as well. Infrastructure at the City's municipal wastewater treatment plant will also be used in the Phase II expansion. The design of Phase II is currently underway and will be presented in detail in 2007. The anticipated effluent parameters include a total nitrogen concentration of 15 mg/L and a continued total phosphorus concentration of 1 mg/L.

2.1.2.1 Nitrogen

Completion of the Phase I expansion will result in a 37% reduction of effluent total nitrogen from the existing concentration of 103 mg/L (2 year daily average as shown in Table 2.4) down to 65 mg/L. This reduction target would be used as a limit until the completion of Phase II in 2009 where the final limit of 15 mg TN/L would be met for the Maple Leaf as well as the City of Brandon and Wyeth effluents through the CWWTF. Furthermore the 65 mg/L effluent concentration will also ensure that there will be no increase in nitrogen loading to the River despite the increase in Maple Leaf's production to 75,000 hogs/week.

Table 2.4 Effluent Total Nitrogen Concentration Discharged from the IWWTF

Month	2004 Effluent Total Nitrogen Concentration (mg/L)	2005 Effluent Total Nitrogen Concentration (mg/L)	Average Effluent Total Nitrogen Concentration (mg/L)
January	121.0	76.7	98.9
February	113.5	105.4	109.4
March	114.8	125.9	120.3
April	128.3	112.0	120.2
May	107.6	80.7	94.2
June	112.4	62.2	87.3
July	114.1	92.5	103.3
August	120.5	104.5	112.5
September	98.3	100.1	99.2
October	141.0	88.4	114.7
November	140.0	82.1	111.1
December	71.7	58.3	65.0
Average Daily Effluent TN Concentration	115.3	90.7	103.0

2.1.2.2 Phosphorus

Completion of the Phase I expansion will result in a 94% reduction in effluent total phosphorus concentration from 16.1 mg/L (2 year average as shown in Table 2.5) to 1 mg/L. This concentration will result in achieving the Province's effluent phosphorus objectives in Phase I and will be carried into Phase II of the CTTWF.

Table 2.5 Effluent Total Phosphorus Concentration Discharged from the IWWTF

Month	2004 Effluent Total Phosphorus Concentration (mg/L)	2005 Effluent Total Phosphorus Concentration (mg/L)	Average Effluent Total Phosphorus Concentration (mg/L)
January	17.6	17.38	17.49
February	17.5	15.28	16.39
March	13.5	19.02	16.26
April	17.3	17.90	17.60
May	14.0	15.80	14.90
June	17.2	18.26	17.71
July	15.9	16.98	16.45
August	15.9	18.28	17.09
September	9.5	17.48	13.48
October	14.4	15.43	14.90
November	15.6	14.84	15.20
December	12.9	17.58	15.25
Average Daily Effluent TP Concentration	15.1	17.0	16.1

2.1.2.3 Overall

The completion of Phase I will effect significant decreases in both the nitrogen and phosphorus concentrations in the CWWTF effluent compared to the existing IWWTF. The 37% reduction in the average nitrogen concentration represents an interim goal towards the 15 mg/L target for Phase II (in 2009) while the Phase I upgrades will already result in effluent phosphorus concentrations meeting the 1 mg/L limit prescribed by the province of Manitoba. Overall the effect of nutrients in the effluent from the IWWTF on the Assiniboine River will be improved by the measures proposed in Phase I, and will be even further improved as a result of the completion of Phase II in 2009.

For information, the Phase 2 expansion will be designed to treat the entire combined wastewater stream in Brandon (i.e. City of Brandon municipal wastewater, Wyeth Organics wastewater, and Maple Leaf Foods (108,000 hogs/week) wastewater) while further removing both nitrogen and phosphorus. The Phase 2 expansion will limit the CWWTF effluent total nitrogen (TN) concentration and total phosphorus (TP) concentration in the combined effluent to below 15 mgTN/L and 1 mgTP/L, respectively, based on a 30 day rolling average. This treatment target is in keeping with current advice from the Province of Manitoba.

2.1.3 Expected Manitoba Conservation Requirements

A summary of the anticipated Phase I effluent criteria is provided in Table 2.6.

Table 2.6. Expected Effluent Criteria for Phase 1 Upgrade

Parameter	Value
Carbonaceous Biochemical Oxygen Demand (daily maximum)	≤ 25 mg/L
Total Suspended Solids (daily maximum)	≤ 25 mg/L
Total Phosphorus (30 day rolling average)	≤ 1 mg/L
Total Nitrogen (30 day rolling average)	≤ 65 mg/L
Fecal Coliform (based on 30 day geometric mean)	≤ 200 MPN / 100 mL
Total Coliform (based on 30 day geometric mean)	≤ 1500 MPN / 100 mL

2.1.4 Interim Industrial Wastewater Treatment Facility Process

The existing treatment and planned process upgrades to accommodate a second Maple Leaf shift are described in Section 4 of the 2003 Proposal. For the current Phase I proposal to achieve the effluent design parameters in Table 2.6 there is no longer a need to construct an equalization pond or Zenon membrane system as outlined in the 2003 Proposal. To achieve the interim Phase I effluent quality the existing facility will be expanded by constructing the following:

- Expansion of the anoxic zone of the existing bioreactor
- One anoxic/aerobic activated sludge basin
- Metal salt dosing system (P reduction)
- Methanol dosing system (N reduction)
- Liquid pH chemical adjustment system
- A chemical storage building for metal salt and pH adjustment chemical storage
- Expanded UV disinfection system

A flow diagram and mass balance illustrating the Phase I treatment process is shown in Figure 2.2.

The 75,000 hogs/wk processing and sanitary wastewater streams will be discharged to the anaerobic basin as is currently practiced. The flow leaving the anaerobic basin will be equalized and balanced over a 7 day period. This flow will be split to two activated sludge reactors (complete with anoxic/aerobic zones arranged in a Modified Ludzack Ettinger configuration). The flow will first enter the anoxic zone where it will be combined with a nitrified mixed liquor return stream and the return activated sludge (RAS) from the clarifier. Under these conditions nitrate will be denitrified to nitrogen gas. To ensure adequate

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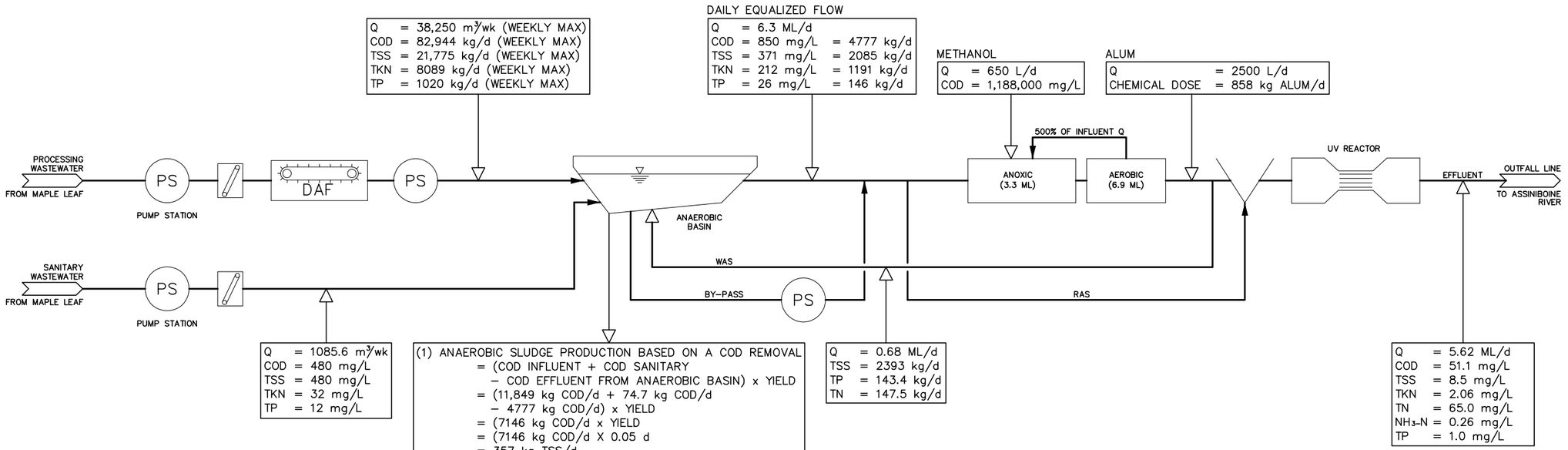

(1) ANAEROBIC SLUDGE PRODUCTION BASED ON A COD REMOVAL
= (COD INFLUENT + COD SANITARY − COD EFFLUENT FROM ANAEROBIC BASIN) x YIELD
= (11,849 kg COD/d + 74.7 kg COD/d − 4777 kg COD/d) x YIELD
= (7146 kg COD/d x YIELD
= (7146 kg COD/d X 0.05 d
= 357 kg TSS/d

(2) WAS = 2393 kg/d

(3) ISS ACCUMULATION
= 21,775 kg/wk x 0.2
= 4355 kg ISS/wk
= 622 kg ISS/d

(4) TOTAL SLUDGE PRODUCTION
= (1) + (2) + (3)
= 357 kg/d + 2393 kg/d + 622 kg/d
= 1230 TONNES/YEAR

NOTES:
1. YIELD WAS ASSUMED TO BE 0.05.
2. ISS FRACTION WAS ASSUMED TO BE 20% OF TSS.

TP MASS BALANCE AROUND SECONDARY TREATMENT (BIOREACTOR)

1. INPUT = INFLUENT TP TO ANOXIC = 146 kg/d

2. OUTPUT = WAS + EFFLUENT
= 143.4 kg/d + 0.53mg/L x 5.19 ML/d
= 143.4 kg/d + 2.75 kg/d
= 146 kg/d

B.M. ELEV.

NO.	REVISIONS	DATE	BY

EarthTech
A Tyco International Ltd. Company

DESIGNED BY	YL	CHECKED BY	
DRAWN BY	SRP	APPROVED BY	
SCALE:	NTS	RELEASED FOR CONSTRUCTION BY:	
DATE	2006/10/26	DATE	

ENGINEER'S SEAL

PRELIMINARY
NOT FOR CONSTRUCTION

CONSULTANT DRAWING NO.
–

THE CITY OF BRANDON

PHASE I INDUSTRIAL WASTEWATER TREATMENT FACILITY UPGRADE

PROCESS
FIGURE 2.2 – FLOW DIAGRAM
75,000 HOGS/wk

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L:\GROUP\ENV\MARKETING\PROJECTS\BRANDON PHASE I 2006\DRAFT NOA REPORT\FIG. 2.2 – FLOW DIAGRAM.DWG

denitrification methanol/ethanol will be dosed as required to provide the necessary carbon source. Flow from the anoxic zone will be passed into the aerobic zone where nitrification, and BOD removal occur. The mixed liquor from each reactor will be combined and enter a splitter box where alum (or an equivalent metal salt) will be added to precipitate phosphorus. The mixed liquor will then flow by gravity to the existing secondary clarifier. Settled mixed liquor (RAS) will be pumped from the clarifier back to the two activated sludge basins. Secondary effluent will flow by gravity to the expanded UV disinfection system prior to discharge to the Assiniboine River.

Due to the precipitation of phosphorus combined with an increase in treated wastewater, biosolids production from the IWWTF will increase by an additional 750 dry tonnes. Currently the biosolids are stored in the anaerobic basin prior to land disposal. To accommodate the increased biosolids production, the sludge stored in the anaerobic basin will require more frequent removal. During winter months it is proposed to use the City of Brandon Cell No. 1 for storage of anaerobically digested sludge. Based on the current rotation of the City's sludge lagoons, Cell No. 1 will be empty and available from October 2007 until October 2008. If additional biosolids storage capacity is required after October 2008 an on-site biosolids storage facility will be constructed that will complement the biosolids management system that will be utilized in Phase II. The storage facility's design will incorporate groundwater and soil protection and monitoring measures in addition to odour management/control methods if necessary.

2.2 PHASE II –CWWTF CONCEPTUAL DESIGN (CONFIRMED IN FUTURE NOA)

Each aspect of the Phase I expansion proposed in this NOA has been designed to complement and facilitate the Phase II expansion. This is done to maximize long term efficiency, plant specific operator knowledge, and to facilitate the interim expansion of the Maple Leaf operation to 75,000 hogs/wk while also minimizing overall cost and accelerating advanced treatment of the effluent from Maple Leaf Foods. The Phase I expansion includes some technical upgrades of the existing IWWTF (such as methanol and alum addition, more automated controls, and additional UV capacity) but the processes involved remain the same. The completion of Phase I will provide the operators of the CWWTF with the opportunity to learn how to moderate the systems to achieve the high level of nutrient reduction required under Phase I and prepare for the Phase II nutrient objectives.

A second NOA will be filed in 2007 for the Phase II expansion that will further develop the CWWTF for the City of Brandon in 2009. The purpose of developing a centralized treatment facility is to more efficiently and effectively treat the effluents from the City municipal wastewater, Maple Leaf Foods and Wyeth Organics to meet the Province's water quality objectives. The combination of these wastewater streams improves the treatability of the overall combined influent by taking advantage of the available synergies between the waste

streams, while simultaneously advancing the wastewater treatment and nutrient removal for a significant portion of the Brandon Area point source effluents to the Assiniboine River.

Section 3.0
Environmental Impact Assessment

SECTION 3.0
ENVIRONMENTAL IMPACT ASSESSMENT

This section of the NOA summarizes the anticipated environmental effects remaining after mitigation and assesses residual effects in comparison to the 2003 Environment Act submission. Where environmental effects are considered to be the same or lower than those predicted in the 2003 submission or the existing system, no further consideration is given.

3.1 AIR QUALITY

Air quality effects are expected to be lower than in the 2003 proposal during both construction and operation of the Phase I expansion due to the reduced magnitude of the project compared to the project proposed in 2003. The 2003 submission assessed effects on air quality in terms of the following general factors:

Construction:

- Vehicle exhaust
- Airborne dust and particulates
- Odours

Operation:

- Vehicle exhaust
- Airborne dust and particulate
- Odours/stack emissions
- Climate change

These factors were assessed as either negligible or low prior to mitigation with the exception of odours during operation which were assessed as presenting a medium potential effect with a relatively large distance to residents and natural dispersion sufficiently mitigating the effect.

The residual air quality effects from the construction and operation of the Phase I project will be similar in nature but smaller in magnitude than the 2003 proposal. Minimal additional odours may be generated during transport of biosolids to the City Lagoon system or potentially from the on-site storage if required. In both of these cases, separation distance and temperature would mitigate odours. In the case of on-site storage, engineered controls (ie. covered storage, biofilters, chemical treatment, etc.) would be designed to mitigate odour effects at nearby residences if necessary.

Additional biosolids transportation (compared to the 2003 proposal) would be undertaken in winter months over a prolonged period of time (once the anaerobic basin has reached its operational storage capacity) but on a limited weekly frequency (7-8 trucks per day) resulting in low potential effect in terms of vehicular emissions.

Production of additional biosolids will not notably increase biogas generation as more organic matter will be removed through chemical pre-treatment and be unavailable for anaerobic decomposition. Biogas will be handled as it is presently through recovery and use at the Maple Leaf Foods plant or flaring.

The potential also exists to further reduce greenhouse gas emissions by reducing the anaerobic basin temperature. This would be accomplished through a reduced consumption of natural gas that would be used towards heating the influent to the anaerobic basin from Maple Leaf Foods. While this measure appears to hold some potential benefits in terms of energy consumption and effluent treatment, it represents only one method of potentially optimizing the plant operations that may be attempted in improving the Phase I CWWTF effluent quality towards Phase II.

3.2 HUMAN HEALTH RISK

Effects on human health from the construction activities associated with the Phase I project are anticipated to be similar in scope but lower in magnitude than the 2003 proposed project. This again, stems from the reduced magnitude of the project. During operation, no significant risks to human health are anticipated that would not be mitigated through the City of Brandon's workplace safety and health program in place and their General Operating Guidelines which have been developed for the plant and will be modified to suit Phase I.

3.3 SURFACE WATER

Aspects of potential surface water effects examined for Phase I include surface water quality effects from construction and operation of Phase I as well as hydrologic effects based upon the withdrawal of water further upstream of the discharge point (The City's water intake is several km upstream of the site). The operational improvements proposed in 2003 for the Maple Leaf facility involved a larger volume of water than what is proposed for Phase I and no adverse hydrologic effects were anticipated in this regard, therefore none are anticipated for the Phase I project.

The potential changes in water quality resulting from the construction and operation of Phase I compared to the 2003 proposal are examined below. Summary factors examined in the 2003 proposal with respect to surface water quality include:

Construction:

- Sediment deposition via runoff
- Chemical spills to ditches
- Water quality in the Assiniboine River

Operation:

- Sediment deposition via runoff
- Chemical spills to ditches
- Water quality in the Assiniboine River

3.3.1 Construction

Surface water quality effects resulting from the construction of Phase I are anticipated to be similar to, or less than, those effects predicted in the 2003 submission due to the reduced project magnitude. The 2003 submission indicated the magnitude of pre-mitigation construction impacts were assessed as low or negligible with respect to the above factors. Similar mitigation techniques would be implemented for Phase I as indicated in the 2003 submission.

3.3.2 Operation

With respect to the effects of operating the 2003 proposed IWWTF on the Assiniboine River, an extensive multi-year aquatics assessment was conducted and presented at the 2003 hearings by North/South Consultants Inc., which examined ammonia, dissolved oxygen, nutrients, and bacteria under both ice-covered and open water conditions.

The results of the study indicated, that under ice covered conditions, the effect of the IWWTF effluent on water quality in terms of oxygen and ammonia concentrations would be considered negligible to small, even under low flow conditions. The assessment examined both the incremental effect of the 2003 proposed expansion of the IWWTF as well as the total cumulative effect of effluent from the 2003-proposed IWWTF. Some long term effects on dissolved oxygen were found to be uncertain due to a potential increase in sediment oxygen demand, although it was considered to likely be reversible as a result of high flow conditions such as a spring freshet.

Under open water conditions, the potential negative effect of the existing IWWTF effluent on water quality in the Assiniboine River with respect to nitrogen and phosphorus inputs would be reduced under the 2003 proposal. The remaining effects were considered to be low to moderate in magnitude, depending upon river conditions, and long term in nature but reversible. The areal extent of most of the effects was predicted to be confined to within or immediately downstream of the mixing zone (ie., to approximately Treesbank) although some small effects had potential to extend to the Portage Reservoir.

A comparison of the typical daily nutrient effluent loading rates and concentrations between the existing system (IWWTF), the 2003 proposal, and the 2006 proposal (Phase I) is provided in Table 3.1.

Table 3.1 Comparison of Nutrient Loads and Concentrations 2004-2005

IWWTF System	Total Nitrogen	Total Phosphorus
Existing Sytem (IWWTF)* (kg/d)	364.8 average*	196 average
2003 Proposed System (kg/d)	160 average, 291 peak	44.2 average, 82 peak
2006 Proposed System (Phase I CWWTF) (kg/d)	282.9 to 417.8 annual average 364.8*	5.5 average
2006 Phase 1 Proposed System Concentration Limit (mg/L)	65	1
Anticipated 2009 CWWTF Concentration Limits (mg/L)	15	1

* based upon average monthly loadings over 2003,

2004, and 2005

The most notable change compared to the 2003 proposal in terms of effluent nutrient content is that the effluent phosphorus concentration will be reduced by 94% to 1 mg/L, meeting the Province's objectives upon completion of Phase I and satisfying the CEC recommendation. Additionally there will be a 37% reduction in the effluent nitrogen concentration coupled with no increase in the nitrogen load resulting from Phase I compared to the existing IWWTF. Phase II will result in a further reduction of effluent nitrogen to 15 mg/L, satisfying the provincial objectives and addressing the CEC's recommendation This represents a long term, positive, and continuing change compared to the existing IWWTF effluent quality.

3.4 SUBSURFACE

Potential subsurface effects examined as part of the 2003 proposal included the following soil and groundwater factors:

Construction

- Chemical/Fuel spills on the site
- Chemical/Fuel spills in ditches
- Disturbance of previously disturbed areas

Operation

- Chemical/Fuel spills on the site
- Chemical/Fuel spills in ditches
- Leakage of Equalization Basin
- Oil drips from vehicles

3.4.1 Construction

The basic construction and mitigation methods expected in the 2006 proposed IIWTF construction are anticipated to be similar in nature but smaller in magnitude than similar aspects of the 2003 proposal. The 2003 proposal predicted pre-mitigation effects that were moderate to low in magnitude with standard mitigation methods reducing the residual effect to nil in each case. Accordingly, construction associated with Phase I is anticipated to have a nil residual effect on soil and groundwater quality.

3.4.2 Operation

As the Phase I expansion involves some different processes and a different configuration than the 2003 proposal, the potential operational effects on soil and groundwater are expected to be slightly different. Mitigation measures for operational fuel and chemical spills and oil drips will be the same as in the 2003 proposal. The main changes compared to the 2003 proposal in terms of potential soil and groundwater effects are outlined in the following subsections along with the mitigation methods where necessary.

3.4.2.1 Project Footprint

Since there are fewer buildings/tanks being added than in 2003, Phase I will involve a smaller project footprint and activities will be confined to a smaller area of the site and therefore present less risk to soil and groundwater quality.

3.4.2.2 Effluent Handling

No additional equalization basin will be constructed as there was proposed in the 2003 submission since flow equalization will be managed solely through discharge from the existing anaerobic basin. Therefore the pre-treated wastewater will be placed into a proven facility with secondary containment and leak detection.

The new bioreactor will be of concrete tank construction to hold liquids in a manner similar to the existing bioreactor on the site and will be leak tested prior to commissioning. In addition, an historical and ongoing groundwater monitoring program has been conducted on the site on at least an annual basis since prior to the construction of the IWWTF in 1999. To date this program has not identified notable groundwater quality changes attributable to the operation of the IWWTF. The groundwater monitoring program will be altered as required by Manitoba Conservation to accommodate the changes in the site as a result of the project. The residual

effects remaining after these mitigation measures are incorporated are considered to be low. No further mitigation is considered necessary in this respect.

3.4.2.3 Chemical Storage

A slab-on-grade pre-engineered building expansion will be added to the existing pump station on the site to provide heated storage of operational chemicals such as metal salts (alum or ferric chloride) and pH adjustment chemicals in proper storage tanks for the Phase I processes. The additional building space is anticipated to be located on the west side of the existing pump station building, which also contains the lab on the site. This building will either be sized to accommodate Phase II chemical storage needs, or be designed to allow for sufficient expansion for Phase II needs. It will be properly constructed to provide additional containment for the chemical storage within the building as required. Accordingly, residual effects on soil and groundwater quality are considered to be low and no further groundwater/soil mitigation is considered necessary.

It is anticipated that there will be a need for additional pH adjustment chemical to be stored on the site as well as the addition of a methanol/ethanol storage tank to aid in denitrification and metal salts in the chemical storage building to precipitate phosphorus. No notable volumes of sodium hydroxide or sodium hypochlorite or citrate are anticipated to be required with the new operation as was required in the 2003 proposal. The methanol/ethanol will be stored in a proper outdoor aboveground storage tank with double containment and leak detection, etc. in compliance with the provincial regulations on fuel storage. The additional pH adjustment chemical will supplement the existing supply of lime from the on-site silo while providing some measure of redundancy and the metal salts will be stored as indicated previously. It is anticipated that the additional pH adjustment chemical will be magnesium hydroxide or other similar chemical (such as sodium carbonate or bicarbonate) and it will be fed into the RAS system in liquid form. Brandon's GOGs will be modified according to the chemicals stored. No notable residual effects are anticipated after applying the proposed mitigation measures.

3.4.2.4 Biosolids Generation

The wastewater generation at Maple Leaf is expected to increase from the existing 30,310 m^3/wk to 38,250 m^3/wk in Phase I, however the flows will be much less than proposed in 2003 (51,639 m^3/wk). This increase in treated wastewater will result in an increase in biosolids production. In addition, the chemical treatment for phosphorus precipitation will produce more biosolids than are presently produced (an approximate overall total of 1200 dry tonnes/year compared to the present 450 dry tonnes/year). Although, the predicted volume of biosolids generated by Phase I (approximately 30,000 – 40,000 m^3/year) is still projected to be notably less than what was predicted for the 2003 proposal (49,433 m^3/year), the 2003 proposal included more biosolids storage volume in the anaerobic basin since additional equalization capacity was provided in the form of a proposed separate equalization basin. The 2003 proposal indicated that the biosolids withdrawal rate would be increased to twice per year compared to the current annual withdrawal, however the reduced storage volume available for Phase I will necessitate removal from the anaerobic basin on a more frequent basis.

3.4.2.5 Biosolids Management

Since land application of biosolids is not permitted in the winter, the City of Brandon will transfer biosolids from the Phase I CWWTF to Cell 1 in their lagoon system for temporary storage prior to land application. Biosolids will be permitted to accumulate in the anaerobic basin up to a predetermined level that ensures continued performance while maximizing sludge storage capacity. Once that level is reached, a temporary continuous low volume removal program would be put in place. The gradual removal minimizes the effect on the treated effluent quality compared to an intensive withdrawal program. This program would result in approximately 7-8 truckloads of biosolids being transferred from the CWWTF to the City of Brandon Lagoons on a daily basis under a 75,000 hog/week Maple Leaf production rate.

The City of Brandon will continue to manage biosolids under the terms of their existing licences governing land application of biosolids from the municipal lagoons (Licence No. 2485) as well as the IWWTF (Licence No. 2506). Additionally, Licence No. 2506 currently permits the City of Brandon to transfer biosolids from the IWWTF to their lagoons under urgent conditions. It is anticipated that a transfer of biosolids to the lagoons will be necessary for a period of approximately 6 months up to October 2008 when the cell will be required for municipal sludge treatment. At that time the accumulated biosolids would be land applied and an additional on-site storage cell will be available as part of the planned Phase II expansion. The City of Brandon may also lease additional suitable land spring through fall as an acceptable location for biosolids to provide further additional capacity if necessary. Biosolids/sludge management options for the Phase II CWWTF are currently under consideration with candidate processes including anaerobic digestion, incineration, and land application being considered.

Nitrogen

Nitrogen content in the Phase I biosolids is not expected to be significantly different than in the 2003 proposal and therefore is not re-examined here.

Phosphorus

The 2003 Proposal concluded there was adequate land available for biosolids application and cited the position that much of the phosphorus would not be considered plant-available. However, with ongoing nutrient management concerns expressed by the general public since 2003, the increase in the biosolids total phosphorus content resulting from the increased phosphorus removal provides sufficient cause for a cursory re-evaluation.

The City of Brandon's current biosolids management consultant was contacted to enquire about the potential effect of the additional phosphorus content on the biosolids management program. Personal communication with Mr. Curtis Navratil of D.W. Diamond Consultants has revealed that, in general, the mineralization of phosphorus is not as well known as that of nitrogen at present. However, based upon past biosolids analyses conducted for Brandon and other locations in Saskatchewan, the amount of plant available phosphorus in the biosolids is typically in the order of 5 to 6% of the total phosphorus content.

The estimated annual biosolids and phosphorus production rates for Phase I are outlined in Table 3.2 based upon the maximum production rate of 75,000 hogs/week and total phosphorus making up 4.2% of the total biosolids (as estimated by Earth Tech).

Table 3.2 Biosolids Phosphorus Production

Annual Biosolids Production at Maximum Production	Biosolids-based Phosphorus Produced Annually as TP	Plant-available Biosolids-based Phosphorus Produced Annually
1,200,000 dry kg/yr	52,560 kg/year	3,153.6 kg/year

* Assuming 6% of total phosphorus

Mr. Navratil also indicated that, based upon plant available phosphorus, land application is often still governed by nitrogen content even in cases of biosolids produced from a phosphorus-removing treatment system.

Based upon limiting application by plant-available-phosphorus to a low annual cereal crop uptake rate of 33.6 kg/ha (from Manitoba Soil Fertility Guides based upon general fertilizer guidelines in the absence of soil tests for crops), and a conversion factor of TP to P_2O_5 of 2.3 the theoretically required annual land space would be approximately 3153.6 kg/year x 2.3 /33.6 kg/ha = 215 ha per year. This is well within the volume of the estimated 8100 ha identified as potentially suitable land within 25 km of the site in the 2003 proposal.

Currently the City of Brandon utilizes approximately ¼ section of land twice per year for land application of IWWTF biosolids (pers. Comm. George Jago, City of Brandon). Assuming that nitrogen remains the limiting factor in determination of the land application rates and that the nitrogen content of the biosolids remains the same, the amount of land required for application would increase in proportion to the increase in biosolids produced. As referenced earlier in this document the IWWTF currently produces approximately 450 dry tonnes/year of biosolids and is estimated to produce approximately 1200 dry tonnes/year during full Phase I operation. With a proportion of 1200/450 applied to the current annual land usage (½ section or 129 ha annually), the estimated additional land required for application as a result of Phase I operation is the current 129 ha plus an additional 215 ha for a total of 344 ha annually.

The estimated potentially suitable land available within 25 km of the IWWTF site was presented in the 2003 proposal as approximately 8100 ha. This level of use represents an idealized potential supply of land for application of biosolids for over 20 years based upon Phase I projections assuming a single application per hectare.

It is acknowledged that soil and biosolids analyses will be required to determine the allowable application rate and limiting soil constituent prior to application on any land and that a plan would have to be filed with Manitoba Conservation prior to application. The application

would be conducted in accordance with the existing Environment Act Licence No. 2506 which governs the management of biosolids from the IWWTF.

In summary, although the phosphorus content of the biosolids produced at the Phase I CWWTF will increase, practical experience reported by the City of Brandon's consultants indicates that nitrogen will likely remain the limiting factor governing land application rates. As the nutrient content does not indicate an unmanageable production of biosolids no further mitigation measures are considered necessary for their management although the issue will be re-examined in detail for the Phase II NOA.

3.5 TERRESTRIAL

Potential terrestrial effects examined as part of the 2003 proposal included the following factors with respect to terrestrial flora and fauna:

Construction

- Habitat reduction
- Habitat alienation due to noise and light disturbance
- Deer collisions
- Vegetation reduction through site development
- Fuel/chemical spills damaging vegetation

Operation

- Habitat alienation due to noise and light disturbance
- Deer collisions
- Native vegetation to remain
- Fuel/chemical spills damaging vegetation

The assessment conducted as part of the 2003 proposal deemed all negative pre-mitigation effects from the above factors to be either low or negligible. These factors and their residual effects/mitigation measures are anticipated to remain unchanged in the implementation of Phase I.

3.6 EMPLOYMENT AND INCOME

Potential employment and income effects, although positive in nature, will be lower than those of the 2003 proposal due to the smaller project size. No notable adverse effects are anticipated to result from the Phase I construction or operation.

3.7 POPULATION

No significant population effects are anticipated as a result of the construction or operation of Phase I. The community has easily handled much larger workforces in the recent past without

incidents and the workforce for this project is anticipated to utilize less than 1% of the local workforce at the peak of construction.

3.8 COMMUNITY PROFILE

The relatively small construction workforce (estimated peak of approximately 30 persons) required for Phase I is not anticipated to present sufficient stimulus to effect a significant change to the community profile. Similarly, the staffing required to operate and maintain the Phase I operations is not anticipated to increase from the present ±2 operators. These effects are smaller than those predicted for the 2003 proposal which assessed the residual effect as insignificant.

3.9 TRANSPORTATION

Potential transportation effects examined as part of the 2003 proposal included the factors indicated below. In all of these cases, the pre-mitigation effects were considered to be low or negligible.

Construction

- Increase in immediate site traffic
- Increase in accident rate

Operation

- Increase in site-bound traffic
- Increase in accident rate

3.9.1 Construction

Traffic volumes generated during the Phase I construction will be smaller than the 100 vpd or less projected in the 2003 proposal and therefore the general effects on transportation will be negligible. The greatest effect would be evident on 65th Street East, north of Richmond Avenue East which provides the main access to the site and one residence further to the immediate northeast of the CWWTF site. The predicted impact remains, as in the 2003 proposal, local, short-term; and, reversible.

3.9.2 Operation

Once Phase I is in operation, the following traffic effects are anticipated:

- Operator traffic: negligible, <10 vehicles per day
- Chemical delivery truck traffic: low, 1-2 trucks of Alum per week, 1-2 trucks of methanol/ethanol per month, additional truckload of pH adjustment chemical per month in addition to existing lime deliveries

- Biosolids transfer truck traffic: 7-8 trucks per day over a period of up to 6 months in addition to existing biosolids land application traffic

Of these traffic groups, the volumes and timing of each is approximately the same or less than what would have been required under the 2003 proposed system. The exception to this is that the frequency of biosolids transfer from the site via truck changes from 2 times per year to a low volume continuous transfer for approximately 6 months, although the overall volume of biosolids transferred per year is reduced compared to the 2003 proposal. The 5-8 trucks per day represent less than a 1% increase in traffic on the nearby Highway 110 where both the north-bound and south-bound 2004 AADTs are in the range of 1400 vpd (in the vicinity of Richmond Avenue East) as reported by the Manitoba Transportation and Government Services - Manitoba Highway Traffic Information System. The impact of this increased biosolids truck traffic would be low in magnitude, local in scope, short-term, and reversible.

With respect to road impacts from increased traffic, no significant unmitigable effects are anticipated. The greatest potential for adverse road effects is on the unpaved 65th Street East north of Richmond Avenue East, near the site. Adverse road effects have potential to occur in spring and wet weather conditions as a result of heavy trucks on an unpaved road. In this case traffic can be limited in terms of load, time and weather to mitigate damage and road repairs could be completed as required. Often, terms of the biosolids spreading contracts include a clause to repair damage to roads created by biosolids transfer and application equipment.

The increase in traffic may lead to the increase in potential for collisions, however the low increase in traffic translates into a relatively low increase in risk of collisions and no further mitigation is considered necessary.

3.10 HERITAGE IMPACTS

As part of the environmental assessment conducted prior to the construction of the IWWTF in 1998, a heritage resource survey was conducted for the entire IWWTF property by Quaternary Consultants Limited. Following intensive examination on the property, the archaeological consultant recommended that there were no further archaeological concerns and that construction could be allowed to proceed without impact to heritage resources.

3.11 LAND USE PLANNING

As in the 2003 submission, construction of Phase I is not anticipated to alter local land use planning. In fact, the site is in an area pre-designated for industry. Furthermore Phase I forms an integral step in the overall planning for a centralized wastewater treatment system in Phase II in 2009. If the planned CWWTF were not realized, development in the City of Brandon could be curtailed due to more stringent wastewater treatment requirements and correspondingly more expensive wastewater treatment options.

3.12 SOCIO-ECONOMIC IMPACT

3.12.1 Construction

As the potential negative environmental effects of Phase I construction are considered negligible or low and mitigation measures will further reduce those effects, there are no significant socio-economic consequences anticipated resulting from the Phase I construction. Outside of the environmental effects, as in the 2003 proposal, there will be a positive effect on the local economy but of a smaller magnitude due to the smaller project size and cost (Approximately $6 Million compared to the previous 2003 cost of more than $15 Million). This Phase I expansion will be funded completely by Maple Leaf and therefore no public funding will be used for the Phase I construction.

3.12.2 Operation

As it has since the construction of the IWWTF in 1999, the operation of Phase I of the CWWTF will act as the primary form of mitigation of water quality effects on the Assiniboine River for the effluent from the expansion of the Maple Leaf Plant. The expansion of the existing IWWTF to the now proposed Phase I CWWTF is an interim step towards the combined wastewater treatment facility that will meet the new nutrient objectives (TN=15 mg/L and TP=1 mg/L) of the Provincial Government. This would not be financially or logistically possible without taking advantage of a combined team effort of two major Brandon area industries (Maple Leaf and Wyeth) and the City of Brandon to achieve this in a cost effective manner.

The subject Phase I proposal represents an opportunity for industrial expansion and economic development in the Brandon area. It also upgrades the wastewater treatment capabilities of the City of Brandon resulting in reduced environmental impact to the Assiniboine River compared to the present day system. With the operational costs of the facility charged to Maple Leaf, the economic consequences to members of the public are virtually nil while a benefit does exist in terms of water quality. The effect of the operation of Phase I on the workforce is negligible, local, and continuous but positive.

3.13 SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION

A summary of the environmental impacts and proposed mitigation measures for those aspects of the Phase I CWWTF project that are notably different from the 2003 proposal is provided in Table 3.3.

Table 3.3 – Summary of Phase I Impacts

Factor	Impact	Additional Mitigation Required or Residual Effect
Air Quality	Odours from transportation of excess biosolids from Phase I CWWTF to Brandon Lagoon Cell 1	None required, conducted in winter in low volumes and frequency of approximately 1 truck/day.
	Additional biogas generation from additional biosolids in anaerobic basin	N/A, Biogas production rate to remain approximately the same as existing.
	Additional odours from temporary storage of excess biosolids.	Engineered controls, covers, chemical application and distance to receptors provides mitigation if necessary.
	Potential reduction in greenhouse gas emissions	None required. Potential benefit derived from possible anaerobic basin temperature reduction and a corresponding reduction in natural gas consumption to heat the influent as well as a reduced consumption of methanol/ethanol as a supplemental carbon source in the denitrification process.
Human Health Risk	No additional impacts	N/A
Surface Water Quality	No additional construction impacts	N/A
	Nitrogen	37% Reduction in effluent nitrogen concentration from 103 mg/L to 65 mg/L.
	Phosphorus	94% reduction to 1 mg/L through Phase I CWWTF. Removal of over 20 tonnes/year of phosphorus from effluent compared to existing IWWTF.

Factor	Impact	Additional Mitigation Required or Residual Effect
Subsurface	No additional construction impacts	N/A
	Overall amount of disturbed soil	Smaller project footprint, employ mitigation measures from 2003 submission.
	Groundwater impacts	No additional equalization basin, leak testing of bioreactor, and an ongoing groundwater monitoring program result in low residual impact.
		Chemical storage in double walled tanks or chemical storage building result in low residual impact.
		Biosolids stored in anaerobic basin with land application every 3-4 months and low volume continuous transfer to Brandon lagoons for temporary storage during winter until Phase II system constructed or on-site storage is constructed. Manageable biosolids program with sufficient land inventory.
Terrestrial	No additional impacts	N/A
Employment and Income	No additional impacts	N/A
Population	No additional impacts	N/A
Community Profile	No additional impacts	N/A
Transportation	No additional construction impacts	N/A

Factor	Impact	Additional Mitigation Required or Residual Effect
	Additional biosolids transportation truck traffic	Low residual effect on traffic.
Heritage Resources	No additional impacts	N/A
Land Use Planning	No additional impacts	Project is key to facilitate future development towards Phase II CWWTF.
Socio-Economic Impact	Construction impacts	N/A, Smaller effect than 2003 submission in terms of capital cost and workforce.
	Operational Impacts	Reduction in nutrient concentration in effluent to the Assiniboine River results in improved water quality Positive but negligible effect on workforce

Section 4.0
Summary of CEC Recommendations and City of Brandon Responses

SECTION 4.0
SUMMARY OF CEC RECOMMENDATIONS AND CITY OF BRANDON RESPONSES

4.1 CEC RECOMMENDATIONS AND COMMENTS

This section addresses the City of Brandon's responses to each of the 13 recommendations brought forth by the Clean Environment Commission as a result of the 2003 hearings on the expansion of the IWWTF. Each recommendation is provided below with a corresponding response from the City of Brandon in the context of the Phase I expansion, where directly applicable.

Recommendation #1: *Manitoba Conservation should issue Environment Act licenses to Maple Leaf Foods Inc. for an alteration to its Brandon hog processing plant and the City of Brandon for an expansion of its Industrial Wastewater Treatment Facility. The licenses should be reviewed by Manitoba Conservation one year after the expanded wastewater treatment facility is put into operation for adherence to the terms and conditions.*

Comment: The City of Brandon was pleased with the recommendation that licenses be issued. However, the one-year review appears redundant and unnecessary, as it is expected that Manitoba Conservation will require submission of reports as appropriate to demonstrate adherence/compliance with the terms and conditions.

Recommendation #2: *The license limits for nutrients in the effluent from the City of Brandon Industrial Wastewater Treatment Facility should be set at 1 milligram per Litre for total phosphorus and less than 10 milligrams per Litre for total nitrogen for the entire year.*

Comment: We understand the total nitrogen limit has been modified to 15 mg/L in accordance with current provincial policy for this and other similar projects. The subject NOA provides the proposed method of achieving these objectives of 15 mg TN/L and 1 mg TP/L by 2009 with an interim reduction through Phase I of 37% in the effluent nitrogen concentration and 94% in the effluent phosphorus concentration. The Phase I interim expansion would provide the first steps towards full satisfaction of this objective with an increase in nitrogen removal to 15 mg TN/L by in 2009 with the completion of Phase II.

Recommendation #3: *The license for the City of Brandon Industrial Wastewater Treatment Facility should include a requirement for the City of Brandon to secure a performance guarantee and letter of credit or bond from the supplier of the treatment system to ensure that effluent limits are achieved and Brandon and Manitoba taxpayers are protected.*

Comment: The City of Brandon agrees with and fully supports this recommendation to be implemented for the Phase II CWWTF. The recommendation should not applicable to the Phase I project as the processes have been proven already and are simply being expanded.. Furthermore, the Phase I expansion is funded completely by Maple Leaf Foods so the risk to Manitoba tax payers is greatly reduced.

Recommendation #4: *Maple Leaf Foods and the City of Brandon should be required to immediately begin development and implementation of ISO-certified Environmental Management Systems for their respective hog processing and industrial wastewater treatment facilities, and complete their Environmental Management Systems by December 2005.*

Comment: While the City organization is not fundamentally opposed to implementing an Environmental Management System (EMS), the type or the requirement to certify should not be mandated in a license. Such systems have been viewed as voluntary, and tend to be driven by business requirements. Furthermore, the environmental compliance performance of IWWTF typically approaches 100% for the discharge from the IWWTF to the Assiniboine River. The City of Brandon already has elements of an EMS developed or under development and the City will continue to work to enhance these elements in their operations.

Recommendation #5: *Maple Leaf Foods should be required to establish Environmental Management Systems consistent with the ISO14001 Standard for hog production operations in Manitoba under its control by December 2005 and should encourage Environmental Management Systems for its suppliers.*

Comment: The City of Brandon has no comment on this recommendation as it pertains only to the operations of Maple Leaf Foods' hog production.

Recommendation #6: *Within 12 months of receiving Environment Act Licenses, both Maple Leaf Foods and the City of Brandon should be required to complete water audits of their respective hog processing and wastewater treatment facilities, and prepare water conservation plans with strategies and targets for reducing water use.*

Comment: The City of Brandon does not have any major objections to this recommendation and they continue to promote water conservation throughout the City and in the operation of the IWWTF and will continue to do so in the operation of the Phase I expansion.

As a practical matter, the IWWTF is not a large water user, so implementing a water reduction program would not appear to have the potential to yield any significant benefit to the environment.

Recommendation #7: *Maple Leaf Foods and the City of Brandon should be required to conduct quarterly groundwater monitoring at high risk locations adjacent to their respective hog processing and industrial wastewater treatment facilities.*

Comment: The City of Brandon and Maple Leaf Foods are committed to the continued implementation of the ongoing comprehensive groundwater monitoring program which has been in effect since prior to the construction of the IWWTF in the form of at least annual monitoring programs. The monitoring program is in place as part of the IWWTF licence and includes annual reporting to Manitoba Conservation. Should groundwater effects from the IWWTF or the Phase I expansion be potentially indicated, the City of Brandon would consider increased monitoring frequency as one of the potential mitigation measures.

Recommendation #8: *The City of Brandon should be required to prepare sludge management plans for the land application of biosolids from its Industrial Wastewater Treatment Facility. The management plans should be updated annually, audited on a routine basis and be made accessible to the public.*

Comment: The City of Brandon agrees with and supports this recommendation. In fact, the City of Brandon has been regulated by Manitoba Conservation Bio-Solids License #2506 since May 16, 2001 and would expect this to continue. This license, among other requirements, stipulated that the City will submit to Manitoba Conservation an operating plan prior to application of bio-solids including soil classifications, sub-soil structure, history of previous bio-solids applications on the lands, monitoring requirements, bio-solids and soils analysis, application rate, methodology for the program, schedule, and reporting requirements. Notice is placed in the Brandon Sun as per license requirements in advance of the application program. All the information provided to Manitoba Conservation, as per the license requirements, are a matter of public record and available to the general public.

Recommendation #9: *Within 12 months of receiving Environment Act Licenses, both Maple Leaf Foods and the City of Brandon should be required to complete greenhouse gas inventories of their respective hog processing and industrial wastewater treatment facilities and prepare greenhouse gas management plans with reduction strategies and targets.*

Comment: The City of Brandon supports the creation of greenhouse gas inventories and already recovers biogas produced in the IWWTF process as a source of energy that is utilized in the Maple Leaf Foods plant to displace natural gas usage. However, the preparation of management plans, reduction strategies and targets must be developed in the context of federal and provincial policies on climate change.

Recommendation #10: *The City of Brandon should be required to increase the number of parameters measured in effluent from the Industrial Wastewater Treatment Facility to include conductivity, heavy metals, parasites and pathogens (e.g. Cryptosporidium, Giardia and E.Coli), organochlorines, pharmaceuticals and other parameters determined to be of concern from periodic effluent screening.*

Comment: The City of Brandon cautiously supports this recommendation. It's monitoring program currently focuses on priority components such as nitrogen, phosphorus and other conventional parameters. It is suggested that such additional screening take place on an annual basis for a specified number of years, with a sunset clause incorporated into this condition so that parameters shown to be present in low or non-detectable levels be dropped from on-going screening programs.

Recommendation #11: *Manitoba Conservation, in cooperation with Manitoba Agriculture and Food, the Prairie Farm Rehabilitation Administration, the Manitoba Pork Council, local and Aboriginal communities, non-governmental organizations and universities should oversee a study to examine the sustainability of hog production in the Assiniboine River basin, develop sustainability indicators, and report on the study to Manitobans by December 2005, with an interim report due December 2004.*

Comment: The City of Brandon has no specific comment on this recommendation as it is an action for the provincial government and the hog industry in general. Should Manitoba Conservation decide to proceed with such a study, the City of Brandon will participate as required.

Recommendation #12: *Manitoba Conservation should establish additional monitoring stations along the Assiniboine River to ensure that adequate water quality data are available for planning and management decisions in the basin.*

Comment: The City of Brandon has no comment on this recommendation, as this is a provincial government matter.

Recommendation #13: *Manitoba Conservation should be directed to complete and report on the Assiniboine River in-stream flow requirements study by March 2004. Consideration should be given to the establishment of a cooperative watershed planning initiative to provide long-term environmental stewardship fro the Assiniboine River basin.*

Comment: The City of Brandon has no comment on this recommendation, as this is a government matter.

Section 5.0
Summary of Notice of Alteration

SECTION 5.0
SUMMARY OF NOTICE OF ALTERATION

5.1 SUMMARY

This Notice of Alteration (NOA) for the City's Industrial Wastewater Treatment Facility 2003 Environment Act proposal has been prepared in accordance with Section 14(1) of The Environment Act.

The original 2003 Proposal included upgrades to the Industrial Wastewater Treatment Facility (IWWTF) to accommodate effluent generated by a second shift at Maple Leaf Foods. The implementation of a second shift at Maple Leaf Foods would have involved an increase in weekly processing capacity from 54,000 hogs/week up to 108,000 hogs/week.

The alterations proposed in this NOA document are related to the proposed changes in the form of interim IWWTF treatment processes and equipment as part of Phase I of a two phased approach towards the development of a Centralized Wastewater Treatment Facility for the City of Brandon. Additionally, the removal of the "interface limits" governing the quality and pollutant loading of the influent from Maple Leaf Foods to the anaerobic basin and the overall minimum temperature of the anaerobic basin is requested. These limits are currently dictated in Sections 8 and 6 respectively of the City of Brandon's current licence (No. 2367 S2 R). The performance is instead proposed to be governed through a new industrial use agreement and/or the existing exchange of energy agreement between the City of Brandon and Maple Leaf Foods.

This NOA concerns only Phase I of this process that allows Maple Leaf Foods to process up to 75,000 hogs/week; a second NOA will be submitted in 2007 for the more complex Phase II where several wastewater streams will be combined and treated. The Phase I project will maximize the use of the existing IWWTF infrastructure while the proposed additional Phase I infrastructure has been designed to complement and match the anticipated Phase II project.

The Phase I interim expansion would make the first steps towards fully achieving the effluent quality objectives of 15 mg TN/L and 1 mg TP/L with an interim reduction in Phase I of 94% in the effluent phosphorus concentration and 37% in the effluent nitrogen concentration by mid 2007. The NOA also summarizes the anticipated method of completely achieving the effluent quality objectives by 2009

Each recommendation resulting from the CEC hearings was addressed in Section 4 of this document. The City of Brandon conditionally supports all of the CEC's recommendations where they pertain to their own operations.

The environmental effects of the NOA have been assessed and compared to the previous 2003 Proposal and the existing IWWTF. All of the environmental effects are considered to be either an improvement or present a nil to low effect compared to the existing plant and the 2003

proposal. The assessment conducted appears to confirm the description of a minor alteration as referred to in The Environment Act Section 14(2). Accordingly, the City of Brandon respectfully requests prompt consideration and approval of this NOA. In addition, the City of Brandon would like to have the ability to install building footings and foundations in the fall of 2006 prior to the onset of adverse winter weather conditions. Therefore, we respectfully request approval of the full NOA or, as an option, a staged approval, for the building footings and foundations.