Town of Neepawa

Request for Alteration to the Town of Neepawa's Industrial Wastewater Treatment Facility, Neepawa, Manitoba

Prepared for:
Town of Neepawa

Prepared by:
Earth Tech (Canada) Inc.
99 Commerce Drive
Winnipeg, MB R3P 0Y7

July 2008

Project No. 97297

EarthTech

Town of Neepawa

Request for Alteration to the Town of Neepawa's Industrial Wastewater Treatment Facility, Neepawa, Manitoba

Prepared for:
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99 Commerce Drive
Winnipeg, MB R3P 0Y7

July 2008

Project No. 97297

Letter of Transmittal

EarthTech

99 Commerce Drive
Winnipeg, Manitoba
R3P 0Y7 Canada

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Refer to File: 97297-03
L:\work\97000\97297\03-Report\EA\Finals with client comments\Ltr_2008 07 09.doc

July 14, 2008

Manitoba Conservation
123 Main Street
Ste. 160 Union Station
Winnipeg, Manitoba, R3C 1A5

Attention: Ms. Tracey Braun, M.Sc.
Director, Environmental Assessment and Licensing Branch

Dear Ms. Braun:

Re: Request for Alteration to the Town of Neepawa's Industrial Wastewater Treatment Facility in Neepawa, Manitoba.

On behalf of the Town of Neepawa, please find enclosed 27 copies and two electronic copies of a Request for Alteration to the Town of Neepawa's Industrial Wastewater Treatment Facility (IWWTF) in Neepawa, Manitoba.

The Town of Neepawa wishes to upgrade the existing IWWTF, which provides treatment for wastewater generated at the Springhill Farms pork processing facility. The land proposed for the development is currently owned by Springhill Farms Inc. and is described as follows:

> Nly 156.35 meters perp pf Sly 512.35 meters perp of all that portion of SW ¼ 35-14-15 WPM lying to the east of line drawn West of, parallel with, and perp distant 155 meters from the most Ely of the Western limits of Lot 1, Plan 23208 BLTO exc. Plan 23208 NLTO.

However a land purchase agreement has been initiated with Springhill Farms Inc. and the Town of Neepawa.

Please find attached the Environment Act Proposal Form and supporting documentation as well as the application fee of $ 5,000.

We trust you will find that the attached documents contain sufficient information to facilitate the approvals process in an efficient manner. Should you require more information or clarification about the submission, please do not hesitate to contact us. We thank you in advance for your timely consideration of this application.

Sincerely,

EARTH TECH (CANADA) INC.
Per:

Stephen Biswanger, P.Eng.
Senior Environmental Engineer

SJB:td

Encls.

Cc: Town of Neepawa
Springhill Farms L.P.

S. Biswanger

RECEIVED JUL 14 2008

Environment Act Proposal Form

Manitoba Conservation

This form prescribes the nature and sequence of the information required to file a proposal for a development pursuant to subsections 10(3), 11(7), and 12(3) of *The Environment Act*.

Name of the development: Town of Neepawa Industrial Wastewater Treatment Facility		
Legal name of the proponent of the development: Town of Neepawa		
Location of the development Street address: Neepawa, Manitoba City or Town:	Municipality: Town of Neepawa Legal description: SW 1/4 35-14-15 W.P.M.	
Name of proponent contact person for purposes of the environmental assessment: Mr. Stephen Biswanger, P.Eng.		
Mailing address: 99 Commerce Drive, Winnipeg, Manitoba, R3P 0Y7	Telephone: 204-477-5381 Email address: stephen.biswanger@earthtech.ca	Fax: 204-284-2040
Date: JULY 9, 2008	Signature of the proponent, or corporate principal of the corporate proponent: [signature], MAYOR Printed name: Robert G. DURSTON	

1) NOTE: **<u>APPLICATION FEE</u> - Refer to Schedule "A" on reverse side.**

2) NOTE: **The proponent should reproduce the underlined portions of each section as noted below, adding the required information following each section as it applies to the development. A response to all the sections is required.**

DESCRIPTION OF THE DEVELOPMENT:

i) <u>Certificate of Title</u> showing the owner(s) and legal description of the land upon which the development will be constructed; or (in the case of highways, rail lines, electrical transmission lines, or pipelines) a map or maps at a scale no less than 1:50,000 showing the location of the proposed development;

ii) Name of the owner of mineral rights beneath the land, if not the same as that of the surface owner;

iii) Description of the existing land use on the site and on land adjoining it, as well as changes that will be made thereto for the purposes of the development;

iv) <u>Land use designation</u> for the site and adjoining land as identified in a development plan adopted pursuant to *The Planning Act* or *The City of Winnipeg Act*, and the <u>zoning designation</u> as identified in a Zoning By-Law, if applicable;

v) A description of all previous studies and activities relating to feasibility, exploration, or project siting and prior authorization received from other government agencies;

vi) A description of the proposed development (including site plans), and the method of operation and hours of operation;

vii) An identification of any storage of gasoline or associated products (e.g. diesel fuel, used oil, heating oil, AV gas, solvents, isopropanol, methanol, acetone, etc.);

viii) A description of the potential impacts of the development on the environment, including, but not necessarily limited to:
- type, quantity and concentration of pollutants to be released into the air, water or on land;
- impact on wildlife;
- impact on fisheries;
- impact on surface water and groundwater;
- forestry related impacts;
- impact on heritage resources;
- socio-economic implications resulting from the environmental impacts.

ix) A description of the proposed environmental management practices to be employed to prevent or mitigate adverse implications from the impacts identified in viii) which will have regard to, where applicable: containment, handling, monitoring, storage, treatment, and final disposal of pollutants; conservation and protection of natural or heritage resources; environmental restoration and rehabilitation of the site upon decommissioning; and protection of environmental health.

SCHEDULE:

The proposed date of commencement of construction, commencement of operation, including staging of the development and termination of operation, if known.

FUNDING:

Name and address of any Government Agency (Federal, Provincial or otherwise) from which a grant or loan of capital funds have been requested, where applicable.

NOTE: ***The Environment Act*** **requires that subject to the Confidential Information clause, Section 47, a proposal shall be filed in the public registry.**

Proprietary information provided in this form should be clearly noted. A separate summary of the proposal excluding the proprietary information should accompany the proposal for the public registry file.

27 copies of any bound report or blueprints supporting the Proposal are required. An electronic version is recommended.

The completed Proposal form should be sent together with a covering letter to:

Director, Environmental Assessment and Licensing Branch
Manitoba Conservation
Suite 160, 123 Main Street
Winnipeg, Manitoba R3C 1A5

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REQUEST FOR ALTERATION TO THE TOWN OF NEEPAWA'S INDUSTRIAL WASTEWATER TREATMENT FACILITY, NEEPAWA, MANITOBA

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Executive Summary

EXECUTIVE SUMMARY

This Notice of Alteration (NOA) describes the proposed upgrades to the existing Town of Neepawa Industrial Wastewater Treatment Facility (IWWTF). The proposed alterations will result in a notable improvement in effluent quality from both the subject IWWTF and the municipal lagoon system as well as resultant improvements to water quality in the Whitemud River. The project represents the culmination of long term efforts by the Town to cooperatively work with the owners of the Springhill Farms facility to correct historic issues with effluent quality and reduce nutrient inputs to Lake Manitoba. This NOA covers the construction, operation, and decommissioning stages of the proposed IWWTF upgrades and the potential environmental impacts associated with each project stage.

The Town of Neepawa owns and operates an existing IWWTF, which currently provides limited wastewater treatment for the Springhill Farms pork processing facility. The Town of Neepawa is the holder of the Clean Environment Commission Order No. 1103VC for the operation of the IWWTF. Currently, the effluent produced by the IWWTF is discharged to the Town of Neepawa Municipal Cell #3 which is periodically discharged to the Whitemud River. This is an interim measure that has been enacted to address poor effluent quality from the existing IWWTF. The altered IWWTF includes proposed treatment upgrades that will allow effluent to be discharged on a continuous basis to a low area that will eventually flow to the Whitemud River. The upgraded IWWTF will no longer require the use of Municipal Cell #3.

The IWWTF upgrades will include the concentration of the main treatment processes at the IWWTF site (as opposed to pre-treatment at the Springhill Farms facility). Initial wastewater treatment at the IWWTF will include screens and a two stage dissolved air flotation (DAF) system in conjunction with a flow attenuation tank. Following these processes, the resulting treated wastewater will undergo additional treatment via activated sludge bioreactors, microfiltration membranes and ultraviolet (UV) disinfection steps. The treated effluent will also be cooled and aerated prior to discharging to the Whitemud River via the existing effluent outfall pipeline to further minimize any potential impacts to aquatic life in the receiving stream.

Innovative process improvements include the removal of fat from the sludge produced in the first stage DAF using a tricanter process. The recovered fat will be stored in a heated vessel and will be used as fuel for an on-site boiler. This will reduce issues with land application and odour generation during sludge stabilization and storage. Sludge produced during the initial treatment and during the activated sludge process will be transferred to one of the existing on-site cells (that will be divided into two cells and re-lined) for storage and isolation prior to land application. The proposed IWWTF has also been designed to provide advanced nutrient removal in support of the Province's nutrient management policy.

The proposed upgrades have been designed to take advantage of the existing infrastructure such as aeration cell #3, the chlorination building, the blower building and the existing outfall structure. The remaining existing infrastructure, such as the anaerobic cell and aeration cells #1 and #2 will be decommissioned. The equipment in the existing chlorination building will also be decommissioned; however the building will be left in place and the existing anoxic tank will be retained for potential water storage. Once the upgraded IWWTF is in operation, the existing DAF at Springhill Farms will no longer be required and will be removed from service.

As part of the environmental assessment process, public consultation was completed including three public open house events. At these open house events, information regarding the proposed facility and the anticipated environmental impacts was presented. Three open houses were conducted to ensure that evolving changes to the proposed IWWTF upgrade resulting from the recent change in hog plant ownership were properly communicated to the public. The public was invited to obtain information and provide comments on the project in each instance and information and explanations were provided as necessary by representatives of the Town of Neepawa and Earth Tech at each event. Additional representation was included from Springhill Farms and Pharmer Engineering in the third open house. Overall, there was very low attendance at the open house events (20 persons in total) but each open house was covered by the Town's website and local newspapers in the form of announcements and news coverage. Comments that generally arose included issues such as questions about the effluent discharge to the river and the technical feasibility of effluent irrigation. Generally, the public Open House attendees were characterized as neutral or positive towards the project. Further, the low attendance at all Open House events indicated little public interest or objection to the project.

In terms of the potential construction environmental impacts, the post-mitigation impacts are anticipated to be minor to negligible in magnitude.

During IWWTF operation, the majority of identified potential impacts were considered to be negligible to minor in magnitude without additional mitigation measures, with the exception of IWWTF discharges during summer months (which were considered to be positive in nature) and potential transportation impacts (which were considered mitigable).

All of the potential environmental impacts and the corresponding mitigation measures examined are summarized along with a subjective assessment of residual impacts in Table E.1.

Table E.1: Summary of Environmental Impacts

Classification of Potential Impact	Project Phase	Potential Impact	Magnitude of Impact	Direction of Impact	Duration of Impact	Frequency of Impact	Scope of Impact	Mitigative Measures	Degree of Reversibility	Residual Impact
Air Quality	Construction	Exhaust Emissions	Minor on site and negligible off site	Negative	Short Term	Continuous during working hours	Local	Vehicles/equipment to be well maintained, vehicle idling kept to a minimum	Reversible	Minor on-site and negligible off site emissions
		Airborne dust and particulates	Negligible	Negative	Short Term	Intermittent	Local	Dust suppression activities such as watering roadways and minimizing the amount disturbed area and re-vegetation where possible	Reversible	Negligible airborne dust and particulates
		Odours	Negligible	Negative	Short Term	Intermittent	Local	Buffer zone to local residents, communication with local residents	Reversible	Negligible odour impacts
		Greenhouse gas emissions from construction equipment exhaust	Negligible	Negative	Long Term	Continuous during working hours	Provincial	Vehicles to be well maintained, vehicle idling kept to a minimum	Irreversible	Negligible construction equipment emissions
		Vehicle, heavy equipment and construction noise	Minor to negligible	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained and operated only during appropriate hours	Reversible	Negligible noise impacts
	Operation	Vehicle exhaust emissions	Minor	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained, vehicle idling kept to a minimum	Reversible	Negligible vehicle emissions
		Airborne dust and particulates	Minor on-site, negligible locally	Negative	Short Term	Intermittent	Local	Dust suppression activities such as watering roadways and site speed limits	Reversible	Negligible airborne dust and particulates
		Odours	Negligible to minor	Positive	Short Term	Intermittent	Local	Consideration of alternative odour control methods	Reversible	Negligible
		Greenhouse gas emissions from IWWTF	Negligible	Positive	Long Term	Continuous	Provincial	Consider additional reduction strategies if possible	Irreversible	Negligible, positive reduction in greenhouse gas emissions
		Noise due to trucks during biosolids application	Negligible to minor	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained and operated only during appropriate hours, if required site speed limits to be imposed	Reversible	Negligible
Groundwater	Construction	Fuel and Chemical Spills	Minor to moderate	Negative	Short to Moderate Term	Rare	Local	Bermed, lined refueling area also used for chemical storage if possible, remediation	Reversible	Negligible
	Operation	Fuel, Chemical and Biosolids Spills	Minor	Negative	Short to Moderate Term	Rare	Local	Secondary containment, spill kits, qualified applicators, minimal fuel at site	Reversible	Negligible
		Leakage from Sludge Cells, Pipelines and Aboveground Tanks	Minor	Negative	Short to Moderate Term	Rare	Local	Inspections, testing, groundwater monitoring program	Reversible	Negligible
		Biosolids Application	Negligible	Negative	Short to Moderate Term	Rare	Local	Application in accordance with Environment Act Licence requirements	Reversible	Negligible

Table E.1: Summary of Environmental Impacts (Continued)

Classification of Potential Impact	Project Phase	Potential Impact	Magnitude of Impact	Direction of Impact	Duration of Impact	Frequency of Impact	Scope of Impact	Mitigative Measures	Degree of Reversibility	Residual Impact
Surface Water	Construction	Fuel and Chemical Spills	Negligible	Negative	Short Term	Rare	Local	Bermed, lined refueling area also used for chemical storage if possible, remediation	Reversible	Negligible
		Waste Disposal Practices	Negligible	Negative	Short Term	Rare	Local	Regular clean-up, wastes stored appropriately and removed from site on a regular basis	Reversible	Negligible
		Sediment and Turbidity	Negligible	Negative	Short Term	Intermittent	Local	Erosion control measures, silt fences if required	Reversible	Negligible
	Operation	Fuel, Chemical and Biosolids Spills	Negligible	Negative	Short to Moderate Term	Rare	Local	Secondary containment, spill kits, qualified applicators, minimal fuel at site	Reversible	Negligible
		IWWTF Discharge Winter Months	Negligible	Negative	Long Term	Continuous	Local to Regional	Upgraded IWWTF to provide improved wastewater treatment	Reversible	Negligible
		IWWTF Discharge Summer Months	Moderate	Positive	Long Term	Continuous	Local to Regional	Upgraded IWWTF to provide improved wastewater treatment	Reversible	Moderate, positive
		IWWTF Discharge	Negligible	Positive	Long Term	Continuous	Provincial	Upgraded IWWTF to provide improved wastewater treatment	Reversible	Negligible, positive
		Biosolids Application Impacts	Negligible	Negative	Short Term	Rare	Local	Application in accordance with Environment Act Licence requirements	Reversible	Negligible
Soil	Construction	Fuel and Chemical Spills	Minor	Negative	Short to Moderate Term	Rare	Local	Bermed, lined refueling area also used for chemical storage if possible, remediation	Reversible	Negligible
		Erosion	Negligible to Minor	Negative	Short Term	Intermittent	Local	Erosion control measures such as minimizing disturbed areas, cover material stockpiles, re-vegetation	Reversible	Negligible
	Operational	Fuel, Chemical and Biosolids Spills	Negligible	Negative	Short to Moderate Term	Rare	Local	Secondary containment, spill kits, qualified applicators, minimal fuel at site	Reversible	Negligible
		Erosion	Negligible	Negative	Short Term	Intermittent	Local	Installation of riprap at outfall location	Reversible	Negligible
		Biosolids Application Impacts	Negligible	Negative	Short Term	Rare	Local	Application in accordance with Environment Act Licence requirements	Reversible	Negligible
Terrestrial - Flora	Construction	Species Loss	Negligible	Negative	Long Term	Once (Rare due to spills)	Local	Minimize disturbed area, natural or assisted re-vegetation	Irreversible	Negligible species loss
		Dust Deposition	Negligible	Negative	Short Term	Intermittent	Local	Dust suppression activities	Reversible	Negligible
	Operation	Dust Deposition	Minor to negligible	Negative	Short Term	Intermittent	Local	Dust suppression activities	Reversible	Negligible

Table E.1: Summary of Environmental Impacts (Continued)

Classification of Potential Impact	Project Phase	Potential Impact	Magnitude of Impact	Direction of Impact	Duration of Impact	Frequency of Impact	Scope of Impact	Mitigative Measures	Degree of Reversibility	Residual Impact
Terrestrial - Fauna	Construction	Habitat Loss	Negligible	Negative	Long Term	Once (Rare due to spills)	Local	Confine activities to project area, re-vegetation	Irreversible	Negligible
		Disturbance due to Noise	Negligible	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained	Reversible	Negligible noise impacts
	Operation	Habitat Fragmentation/ Alienation	Negligible	Negative	Long Term	Continuous	Local	Re-vegetation	Reversible	Negligible
		Disturbance due to Noise	Negligible	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained, if required site speed limits to be imposed	Reversible	Negligible
Human Health	Construction /Operation	Worker Health and Safety	Negligible to major	Negative	Short to Long Term	Rare	Local	Manitoba Workplace Safety and Health regulations to be followed	Reversible to Irreversible	Negligible
	Operation	IWWTF Outputs	Negligible	Negative	Short to Long Term	Rare	Local	Appropriate treatment of wastewater and biosolids	Reversible to Irreversible	Negligible
		Decommissioned Infrastructure	Negligible	Negative	Short to Long Term	Rare	Local	Restrict site access with fence	Reversible to Irreversible	Negligible
Transportation	Construction	Vehicle Congestion	Minor	Negative	Short term	Intermittent	Local	Limit transport to/from site off peak hours if possible	Reversible	Negligible
		Vehicle Collisions	Negligible	Negative	Short term	Rare	Local	Provide appropriate signage, if required, impose site speed limits	Reversible to Irreversible	Negligible
	Operation	Vehicle Congestion	Moderate	Negative	Short Term	Intermittent	Local	Limit transport to/from site off peak hours if possible	Reversible	Minor, some local inconvenience during the annual biosolids application
		Vehicle Collisions	Minor to major	Negative	Short to Long Term	Rare	Local	Provide appropriate signage, if required, impose site speed limits	Reversible to Irreversible	Negligible
		Damage to Infrastructure	Minor to moderate	Negative	Short Term	Intermittent	Local to Regional	Identify damage and repair as soon as practical	Reversible	Negligible
Heritage Resources Impacts	Construction	Disturbance or demolition of heritage resources	Negligible	Negative	Long Term	Once	Local	Notify appropriate authorities if heritage resources are encountered	Reversible to Irreversible	Negligible
	Operation	Not applicable	-	-	-	-	-	-	-	-
Land Use Planning	Construction /Operation	Facility construction and operation	Negligible	Negative, Neutral or Positive	Long Term	Continuous	Local to Regional	The Town of Neepawa to communicate with local businesses and residents if impacts are identified	Reversible	Negligible

Section 1.0
Introduction

SECTION 1.0
INTRODUCTION

This Notice of Alteration (NOA) describes the proposed upgrades to the existing Town of Neepawa wastewater treatment facility which provides treatment for wastewater generated at the Springhill Farms L.P. (Springhill Farms) pork processing facility. The existing wastewater treatment facility will be referred to in this document as the existing Town of Neepawa Industrial Wastewater Treatment Facility (IWWTF) or the existing IWWTF whereas the proposed upgraded treatment facility will be referred to as the proposed IWWTF. This report covers the construction, operation, and decommissioning stages of the proposed IWWTF and the potential environmental impacts associated with each project stage.

1.1 OVERVIEW OF THE TOWN OF NEEPAWA

The existing and proposed IWWTF sites are located on the eastern edge of the Town of Neepawa in Manitoba. The Town of Neepawa is surrounded by the R.M. of Langford, R.M. of Lansdowne and the R.M. of Rosedale in western Manitoba. The Town of Neepawa, as of 2006, had a population of 3,298 (Statistics Canada, 2007a). Major system highway access for the Town of Neepawa includes the Yellowhead Provincial Highway No. 16 and Provincial Highway No. 5.

The existing and proposed IWWTF sites are located approximately 144 km east of the Manitoba-Saskatchewan border, approximately 305 km (190 mi) west of the Manitoba-Ontario border, approximately 137 km (85 mi) north of the Canada-United States of America border, and approximately 59 km (37 mi) west of Lake Manitoba. The nearest cities and towns along with their approximate distance from the Town of Neepawa include: the Town of Gladstone (37 km or 23 mi east), Town of Minnedosa (29 km or 18 mi west), the Town of Carberry (45 km or 28 mi south), the City of Brandon (75 km or 47 mi southwest) and the City of Winnipeg (175 km or 109 mi southeast) (Travel Manitoba Canada, 2007). The closest First Nation Community is Rolling River First Nation, located approximately 46 km (28.6 mi) northwest of the IWWTF site within the R.M. of Clanwilliam (Indian and Northern Affairs Canada, 2004).

1.2 GENERAL PROJECT DESCRIPTION

This NOA is for the construction and operation of a proposed upgraded Town of Neepawa IWWTF. The Town of Neepawa owns and operates an existing IWWTF, which currently provides wastewater treatment for the Springhill Farms pork processing facility. The Town of Neepawa is the holder of the Clean Environment Commission Order No. 1103VC for the operation of the IWWTF. Currently, for further treatment, the treated effluent produced by the IWWTF is discharged to the Town of Neepawa municipal cell #3 which periodically discharges to the Whitemud River as per Manitoba Conservation Emergency Discharge Orders. This is an interim measure that was enacted due to poor effluent quality from the IWWTF. The proposed IWWTF is to discharge on a continuous basis in compliance with Provincial regulations, directly to the Whitemud River once the upgrades are complete.

The existing and proposed IWWTF sites are located in the southwest quarter section of 35-14-15 WPM. The existing IWWTF site property is legally described as lot 1, Plan 23208 and is owned by the Town of Neepawa. The proposed IWWTF site is legally described as Nly 156.35 meters perp pf Sly 512.35 meters perp of all that portion of SW ¼ 35-14-15 WPM lying to the east of the line drawn West of, parallel with, and perp distant 155 meters from the most Ely of the Western limits of Lot 1, Plan 23208 BLTO exc. Plan 23208 NLTO. The proposed IWWTF site is currently owned by Springhill Farms Inc., however the process of subdivision of the proposed site location for sale of land to the Town of Neepawa has been initiated. As construction of the proposed IWWTF may begin prior to completion of the subdivision, a lease agreement between Springhill Farms Inc. and the Town of Neepawa has been prepared. The offer to purchase and the lease agreement are included in **Appendix A**. **Figure 1.1** shows the proposed location of the IWWTF relative to the existing IWWTF, the Whitemud River and the Springhill Farms pork processing facility.

This NOA document is being submitted to describe the construction and operational environmental impacts of a proposed upgraded IWWTF. The proposed upgraded IWWTF will treat wastewater produced by the Springhill Farms pork processing facility (a 7 day equalized flow of 1,520 m^3/day) prior to discharging treated effluent to the Whitemud River on a continuous basis. The IWWTF will treat wastewater from the Springhill Farms pork processing facility under the agreed terms of an Industrial Services Agreement (included in **Appendix B**).

Initial wastewater treatment will be completed with screens and a two stage dissolved air flotation (DAF) system in conjunction with a flow attenuation tank. Following these processes, the resulting treated wastewater will undergo additional treatment via activated sludge bioreactors, membranes and ultraviolet (UV) disinfection steps. The treated effluent will also be cooled and aerated prior to discharging to the Whitemud River via the existing effluent outfall pipeline.

Fat will be removed from the sludge produced in the first stage DAF unit using a tricanter process. The recovered fat will be stored in a heated vessel and will be used as fuel for an on-site boiler. Sludge produced during the initial treatment and during the activated sludge process will be transferred to an existing on-site cell (which will be further divided into two cells and be re-lined) for storage and isolation prior to land application.

The environmental goal of the proposed upgrades to the Town of Neepawa IWWTF is to ensure the plant is designed, constructed, operated, and eventually decommissioned in full compliance with all environmental requirements of the Province of Manitoba.

1.3 REGULATORY PROCESS

The environmental assessment and licensing of projects in Manitoba is legislated under The Environment Act (the Act) and its subsequent regulations and guidelines. The Act is administered by Manitoba Conservation. Under the Act, if alterations to a licenced development do not conform to the licence requirements or are likely to change the environmental impact, approval is required before the alteration can be implemented. For licenced developments, a Notice of Alteration (NOA) is submitted to Manitoba Conservation for consideration following this process.

Alterations to a licenced development can be either minor or major. An alteration is considered minor if the potential negative environmental impacts resulting from the alteration are insignificant and there is not an alteration to a licence condition amended by an appeal. If an alteration is not minor, the alteration is a major alteration and a Notice of Alteration meeting the requirements of a new proposal is required for approval consideration.

Based on a letter dated February 26, 2007 from the Environmental Assessment and Licensing Branch of Manitoba Conservation, the proposed upgrading of the IWWTF would be assessed as a major alteration pursuant to **Section 14** (3) of the Environment Act. Further, as the proposed upgrades would consist of a major alteration, a Notice of Alteration describing the potential environmental impacts of the project should be filed under **Section 11** (1) of the Act.

Section 2.0
Site Description

SECTION 2.0
SITE DESCRIPTION

The proposed IWWTF site is located at the eastern boundary of the Town of Neepawa, approximately 2.1 km (1.3 mi) east of the intersection of Provincial Highway No. 16 and Provincial Highway No. 5. It is located directly west of the existing Town of Neepawa IWWTF within the western portion of SW 35-14-15 W.P.M.

The proposed IWWTF site is approximately 2.3 ha (5.6 acres) in size and is currently owned by Springhill Farms Inc., however as indicated in Section 1.0, a land purchase process with the Town of Neepawa is currently underway. The property is bordered by open land owned by Springhill Inc. to the north, south and west and the existing IWWTF to the east. The closest flowing surface water body, excluding treatment ponds and drainage ditches, is the Whitemud River, located approximately 775 m (2,543 ft) northwest of the IWWTF site. It is proposed that effluent from the upgraded IWWTF will be discharged to a low area near the Whitemud River using the existing effluent outfall (not including the temporary transfer hose) as shown in **Figure 1.1**.

On a larger scale, the proposed IWWTF site is located approximately 144 km (89 mi) east of the Manitoba-Saskatchewan border, approximately 305 km (190 mi) west from the Manitoba-Ontario border, approximately 137 km (85 mi) north from the Canada-United States of America border, and approximately 59 km (37 mi) west of Lake Manitoba. The nearest cities and towns along with their approximate distance from the Town of Neepawa include: the Town of Gladstone (37 km or 23 mi east), the Town of Minnedosa (29 km or 18 mi west), the Town of Carberry (45 km or 28 mi south), the City of Brandon (75 km or 47 mi southwest), and the City of Winnipeg (175 km or 109 mi southeast) (Travel Manitoba Canada, 2007). The closest First Nation Community is the Rolling River First Nation, located approximately 46 km (28.6 mi) northwest of the proposed IWWTF site (Indian and Northern Affairs Canada, 2004).

The proposed IWWTF site location and the entire effluent pipeline route is located on land owned by the Town of Neepawa and Springhill Farms Inc. The current zoning of the proposed IWWTF site is MH – Industrial Heavy Zone. The effluent pipeline route is zoned MH – Industrial Heavy Zone, AR – Agricultural Restricted Zone and O – Open Space, according to the Town of Neepawa Zoning Maps 1 and 2 (By-law No. 2650).

The Rural Municipality (R.M.) of Langford is located to the south, east and north of the proposed IWWTF site, with the surrounding lands zoned as AG 80 – Agricultural General Zone. West of the proposed site, within the Town of Neepawa, the land is zoned AR – Agricultural Restricted Zone and CH – Commercial Highway Zone. The land immediately surrounding the proposed site is zoned MH – Industrial Heavy Zone. The zoning of the proposed IWWTF site and the surrounding land is indicated in **Figure 2.1**.

According to the Town of Neepawa Zoning By-law, sewage treatment and lagoons are conditionally permitted for lands zoned MH – Industrial Heavy Zone.

2.1 STUDY AREA

The regional study area comprises all areas within a 10 km (6.2 mi) radius of the proposed facility centre as shown in **Figure 2.2.** A greater detail of study has been conducted within a 3 km (1.9 mi) radius (**Figure 1.1**) where effects of the proposed development are anticipated to be more prominent. The larger study area includes the Town of Neepawa and the northern portion of the R.M. of Langford, the southern portion of the R.M. of Rosedale and the south-western portion of the R.M. of Lansdowne. The 10 km (6.2 mi) radius boundary extends approximately to the intersection of Provincial Highway No. 16 and Provincial Road No. 464 to the west, approximately 1.1 km (0.7 mi) south of the community of Hallboro to the south, approximately 2.9 km (1.8 mi) to the west of the intersection of Provincial Highway No. 16 and Provincial Road No. 352 to the east and approximately 1 km (0.6 mi) to the south of the intersection of Provincial Highway No. 5 and Provincial Road No. 471 to the north. The 3 km (1.9 mi) radius area extends approximately 3.6 km (2.2 mi) to the north of Provincial Highway No. 16, approximately 2.7 km (1.7 mi) to the east of the eastern Town of Neepawa limits, approximately 2.5 km (1.6 mi) south of Provincial Highway No. 16 and to the west to approximately the intersection of First Avenue and Mill Street in the Town of Neepawa.

As of 2006, the estimated population within the 10 km (6.2 mi) radius of the proposed IWWTF site was approximately 3,732 persons, the majority of whom reside in the Town of Neepawa (3,298 persons). Within the 3 km (1.9 mi) radius of the proposed IWWTF site, it is estimated that the total population is about 1,886 persons, with 1,858 of the 1,886 persons residing in the Town of Neepawa and the remaining 28 persons residing in the R.M.s of Langford, Lansdowne and Rosedale. The estimated population was based on the density of the population within the Town of Neepawa and the R.M.s of Langford, Rosedale and Lansdowne and the portion that each of the four areas occupied within the 10 km (6.2 mi) and 3 km (1.9 mi) radius. As of 2006, the approximate population density within the Town of Neepawa was 187.7 people per square kilometre (480.3 people per square mile). Within the R.M. of Langford, the population density was 1.4 people per square kilometre (3.6 people per square mile). In the R.M.s of Lansdowne and Rosedale the population density was 1.0 and 1.9 people per square kilometre (2.6 and 4.9 people per square mile) respectively (Statistics Canada, 2007a, 2007b).

2.2 GENERAL PHYSICAL SETTING

The proposed IWWTF site is located just within the limits of the Town of Neepawa, Manitoba (**Figure 1.1**). The Town of Neepawa is surrounded by the R.M. of Langford and the R.M. of Rosedale.

Topography in the Neepawa area varies from a nearly level to gently rolling pattern, with a general decrease in elevation towards the Whitemud River. Elevation at the site ranges from 358 meters (1175 ft) above sea level (m.a.s.l.) in the northern portion to 366 m.a.s.l. (1,200 ft) in the southern portion.(Michalyna et al., 1976). Topography within 3 km (1.9 mi) of the proposed IWWTF is shown in **Figure 2.3**.

2.3 GEOLOGICAL BACKGROUND

According to Ehrlich et al., the Carberry area (including the Town of Neepawa) is underlain by shales, sandstones and evaporates with bedrock formations from the Cretaceous and Jurassic periods (1957). According to Michalyna et al., the Neepawa area is underlain by rocks and sediments of the Vermilion formation, the Favel formation and the Ashville formation. These three formations contain shale, limestone, bentonite, and minor amounts of sand and silt (1976). According to the bedrock surface topography map prepared by the Province of Manitoba, Department of Natural Resources, Water Resources Branch, bedrock surface elevation in the vicinity of the Town of Neepawa is approximately 330 m.a.s.l. (1,083 ft) (Province of Manitoba, 1988).

Surface materials are quite varied in the region due to glacial action followed by deposition. The surface materials in the vicinity of the site are described by Michalyna et al. as medium to moderately fine lacustrine and moderately coarse to coarse lacustrine surface deposits (1976). Further information regarding soils is included in **Section 2.4**.

2.4 SOILS

2.4.1 Soils of the Brandon Region

The soils of the Brandon Region including a small area around the Town of Neepawa have been surveyed on a detailed level (scale 1:20,000).

Based on the detailed soil survey of the Neepawa area, the soils at the proposed IWWTF site and along the effluent pipeline route consist of the Stockton series, Sewell series, Lavenham series, Hummerston series, Vordas series, Torcan series, and Taggart series as shown on **Figure 2.4** (Michalyna et al., 1976). Descriptions of the soil series present in the vicinity of the proposed IWWTF site are included in the following sections.

Stockton Series

The Stockton series soil texture is considered to be a loamy fine sand. Its topography is very gently sloping to irregular undulating with moderate runoff. These soils are considered moderately to well drained and may be subject to wind erosion if not properly managed. The Stockton series was developed on weakly to moderately calcareous sandy textured lacustrine and deltaic deposits.

Sewell Series

The Sewell series soils have a loamy fine sand texture. These soils were developed on weakly to moderately calcareous sandy textured lacustrine and deltaic deposits. The topography is level to depressional. Permeability is rapid when free water is more than 0.7 m (2.3 ft) below the ground surface, however it is restricted when free water is at or near the ground surface.

Lavenham Series

The Lavenham soil series includes soils of a loamy fine sand texture and are generally level to very gently sloping. Soil permeability is considered moderately rapid but may be restricted when the water table is high. These soils have developed on weakly to moderately calcareous sandy textured lacustrine and deltaic deposits and are susceptible to erosion.

Hummerston Series

The Hummerston soils have a variable soil texture consisting of loamy fine sand with local areas of very fine sand or loamy very fine sand. These soils have developed on weakly to moderately calcareous sandy textured lacustrine and deltaic deposits. The topography is level to irregular and gently undulating. Permeability is considered moderately rapid however it is impeded when the water table is high in the spring and early summer.

Vordas Series

The Vordas series soils have a silt loam texture. They developed on strongly to very strongly calcareous loamy lacustrine sediments and have topography that is level to depressional. Soil permeability is moderate but may be restricted when free water occurs within a meter from the ground surface.

Torcan Series

The soil texture of the Torcan series is considered silty loam. These soils were developed on strongly to very strongly calcareous loamy lacustrine sediments and occur on very gently sloping or intermediate to lower slope positions of undulating topography. Soil permeability is moderate but may be restricted when free water occurs within a meter of the ground surface.

Taggart Series

The soil texture of the Taggart series is considered silty loam. These soils were developed on strongly to very strongly calcareous, loamy lacustrine sediments. Topography of the Taggart series is considered level to very gently sloping. Permeability is moderate however it may be restricted when free water occurs within a meter of the ground surface.

2.4.2 Soils at the IWWTF Site

A detailed geotechnical investigation at the existing IWWTF site was undertaken by UMA Engineering Ltd. in February, 1986. The investigation included drilling and sampling of 22 testholes and installation of three standpipe piezometers. Falling head permeability tests were conducted to determine the in-situ permeabilities at the three piezometer locations. A constant head test was also completed in the laboratory to determine soil permeability. A copy of the complete report is provided in **Appendix C.** According to the geotechnical report, the existing IWWTF site is located on a flat plain flanked on the east and west boundaries by topographical depressions. The ground surface slopes to the north at a grade of approximately 1%.

According to the report findings, the soil profile consisted of topsoil approximately 0.3 m (1 ft) thick, underlain by brown sand that extends approximately 6 m (19.7 ft) below the ground surface, overlying grey sand. The topsoil was black, silty and organic. The underlying brown sand was fine to medium with subangular particles and was of medium density. The sand was moist at the surface and was wet approximately 3.0 to 4.0 meters (9.8 to 13.1 ft) below the ground surface. The brown sand was underlain by grey sand which was wet, fine and silty. The fine sand became a sandy silt with depth. The field falling head tests found that the average permeability of the grey sand was 1.5×10^{-4} cm/s (5.9×10^{-5} in/s). The laboratory constant head test produced a permeability value of 3.4×10^{-4} cm/s (1.3×10^{-4} in/s). The groundwater elevations were measured in the three installed piezometers which indicated an apparent flow in a northerly direction.

A geotechnical investigation was completed at the proposed IWWTF site in May 2008 by Dyregrov Consultants. A copy of the complete report is included in **Appendix C**. The investigation included the installation of five testholes. The soil profile encountered during the investigation consisted of a very fine uniformly graded sand deposit with little or no fines (silt and clay) in approximately the upper 2.0 meters (6.5 ft). The silt and clay fraction was less than 10 percent. The sand contained 40-60 percent silt and clay sizes below this depth. Sand was encountered in all boreholes to a maximum depth of 6.1 m (20 ft). The sand was wet to saturated at depths ranging from 1.8 to 2.4 m (6-8 ft).

2.4.3 Soil Capability for Agriculture

According to the Canada Land Inventory (CLI), mineral soils are grouped into seven classes according to soil survey information. Classes 1, 2 and 3 are considered to be suitable for sustained production of field crops; Class 4 is considered to be marginal; Classes 5 and 6 are considered useable but not generally suitable for crop production. According to the CLI, the area of the proposed IWWTF site is classified as Class 4.

Within the 3 km (1.9 mi) study area, the majority of the soils are designated as Class 4, soils with severe limitations that restrict the range of crops or require special conservation practices. There are also soils designated as Class 2, soils with moderate limitations that restrict the range of crops or require moderate conservation practices and Class 3, soils with moderately severe limitations that restrict the range of crops or require special conservation practices (**Figure 2.5**) (Canada Land Inventory, 2000a).

2.5 HYDROLOGY

The Whitemud River has a total drainage basin area of approximately 7,400 km² (2,857.2 mi^2) (AAFC-PFRA, 2004) and is partially regulated by the Lake Irwin Dam on Boggy Creek, just upstream of the Town of Neepawa, at which point the upstream drainage area is approximately 830 km² (320.5 mi^2). Between the Lake Irwin Dam and the proposed effluent outfall for the Town of Neepawa IWWTF, Boggy Creek becomes the Whitemud River at its confluence with Stony Creek, which adds drainage from approximately 330 km² (127.4 mi^2) along the southwest edge of Riding Mountain, west and northwest of the Town of Neepawa.

Similar to all north-temperate prairie rivers, the Whitemud River undergoes wide seasonal fluctuations in discharge associated with frozen conditions in the winter and the annual spring melt, but a relatively consistent base flow is maintained in the river through operation of the Lake Irwin Dam. Further augmentation of base flows is provided by groundwater discharge in headwater tributaries, particularly along the slope of Riding Mountain (including the upper reaches of Stony Creek) and, downstream of the Town of Neepawa, in creeks receiving discharge from the Assiniboine Delta Aquifer (particularly Pine Creek). These discharges and releases from the Lake Irwin Dam ensure that some flow is maintained at all times in the river downstream of the Town of Neepawa. The river's deeply incised channel and numerous small weirs throughout its run (including anthropogenic weirs, ford crossings, and beaver dams) tend to moderate water levels in the river during periods of low flow and prevent drying of the channel.

Current operation of the Lake Irwin Dam (on Boggy Creek, just upstream of the Town of Neepawa) is based on a fixed release of 0.2 m³/s (7.1 cfs), with additional flows occurring over a fixed spillway structure when water levels are high in the lake (Buermeyer pers. comm.., 2007; Laychuk pers. comm., 2008). Based on estimates derived from a flow relationship described in **Appendix D**, typical (median) mean monthly flows in the Whitemud River in the Town of Neepawa (downstream of the confluence with Stony Creek) are approximately 5.9 m³/s (208.4 cfs), 1.4 m³/s (49.4 cfs), and 0.56 m³/s (19.8 cfs) in April, May and June, respectively, declining to near the base flow for the remainder of the year.

As discussed in **Appendix D**, 0.2 m³/s (7.1 cfs) appears to represent a fairly consistent base flow in the river at the Town of Neepawa from July through March in most years. However, during the period of the historical dataset (1961-1992), late-summer flows were frequently below 0.15 m³/s (5.3 cfs), and dropped below 0.1 m³/s (3.5 cfs) approximately 10% of the time. For the purposes of this assessment, it is assumed that 0.2 m³/s (7.1 cfs) in the Whitemud River at the Town of Neepawa is both the typical flow for the July-March period and the minimum flow in all months of the year. However, discharge measurements and periodic communication with the Water Resources Branch of Manitoba Conservation may be necessary to confirm real-time flows in the river at the Town of Neepawa and their relationship to operational releases from Lake Irwin.

Downstream of the Town of Neepawa, inflows to the Whitemud River occur throughout its run during periods of surface runoff, but incremental increases in flow during dry periods appear to be restricted to the reach of the river downstream of the Town of Gladstone, likely due to base flows in tributaries such as Big Grass Marsh Drain, Pine Creek, and Rat Creek. At the Water Survey of Canada Gauging Station 05LL005 near the community of Keyes (approximately 75 km (46.6 mi) downstream of the Town of Neepawa), mean annual flow is 2.0 m^3/s (70.6 cfs), approximately 11% higher than the mean annual flow at the Town of Neepawa (1.8 m^3/s (63.6 cfs)), estimated through the flow relationship described in **Appendix D**). However, comparison of flows indicates that, during base-flow periods, the net increase in flows between the Town of Neepawa and the community of Keyes is near zero. Therefore, an estimated base flow of 0.2 m^3/s (7.1 cfs) is likely appropriate for the river from the Town of Neepawa to the Town of Gladstone, for the July-March period.

Drainage at the existing IWWTF site occurs by percolation into the soil and by overland flow with flow generally moving in a northwesterly direction towards the Whitemud River. As shown in **Figure 2.6**, there are first, fourth and fifth order drains within a 3 km (1.9 mi) radius of the proposed IWWTF site, with second and third order drains situated just outside of the 3 km (1.9 mi) radius. Approximately, 0.7 km (0.4 mi) northwest of the proposed site, there is the Whitemud River which is a fifth order drain traveling in a northeasterly direction. Approximately 1.9 km (1.2 mi) east of the proposed site, there is a first order drain that flows in a northeasterly direction, joining up with a second order drain, approximately 3 km (1.9 mi) from the site that meanders northward towards the Whitemud River, approximately 3.5 km (2.2 mi) northeast of the proposed site. Stoney Creek, a fourth order drain, flows in a northeasterly direction, joining up with the Whitemud River, approximately 2 km (1.2 mi) west of the proposed site, 1.9 km (1.2 mi) north of Lake Irwin and 1.1 km (0.7 mi) northeast of Park Lake (Manitoba Land Initiative, 2008).

It is proposed that the IWWTF buildings and tanks be constructed on elevated mounds of soil or fill to allow precipitation to flow away from them. According to previously presented topographic information, overall surface drainage at the proposed site likely drains in a northwesterly direction towards the Whitemud River, a significant natural drainage channel in the vicinity of the proposed site location. The Whitemud River is located approximately 775 m (2,543 ft) to the northwest of the site and flows in an easterly direction towards Lake Manitoba.

A review of the Neepawa Area Flood Risk Map produced by Environment Canada indicates that a portion of the subsurface effluent pipeline route is located on a floodway as shown in **Figure 2.7.** There were no available flood risk maps for the proposed IWWTF site, however according to Ron Bryer of Manitoba Water Stewardship, the proposed IWWTF site is not located on a flood plain and is not at flood risk.

2.6 SURFACE WATER QUALITY

Since 1990, the Province of Manitoba has collected water samples at various times from seven monitoring stations along the Whitemud River. However, sampling at the upstream stations (near Neepawa) was discontinued after April 1992, and three stations between the Town of Neepawa and the Town of Gladstone were last sampled in 1998, following a three-year watershed study that used data from stations on the Whitemud River and major tributaries (Hughes, 1999). Since 2002, monitoring has been conducted only at Stations MB05LLS005 on Boggy Creek between Lake Irwin and the Town of Neepawa and MB05LLS001 at the community of Westbourne, near Lake Manitoba. This surface water assessment is based primarily upon interpretation of the datasets provided by Manitoba Conservation for the Whitemud River and its tributaries, and particularly on those monitoring stations between the Town of Neepawa and the Town of Gladstone, the locations of which are shown in **Figure 2.8.**

Despite agricultural, municipal, and industrial influences in the Whitemud River watershed, concentrations of anthropogenic contaminants are generally low. Potentially toxic metals in the river have been below Manitoba Water Quality Objective and Guidelines (MWQSOGs) values in all samples collected except for copper and iron, which occasionally exceed Objective and Guideline values both upstream and downstream of the Town of Neepawa. These metals likely originate naturally in the local soils, and commonly exceed Objective and Guideline values in hard surface waters and groundwaters. Total dissolved solids concentrations frequently exceed the Guideline for irrigation downstream of the Town of Neepawa, and are likely reflective of a combination of the local soils, effluents to the river, and intrusion of naturally occurring saline groundwater between the Town of Neepawa and the community of Westbourne.

Concentrations of organic chemicals, such as phenols, herbicides and pesticides, in the Whitemud River have been below MWQSOGs with few exceptions. Specifically, of the 100 samples collected from the river (from Stations MB05LLS005 and MB05LLS011 upstream of the Town of Neepawa and MB05LLS001 near the community of Westbourne) and analyzed for these parameters, the irrigation Guidelines were exceeded for Bromoxynil in one sample, Dicamba in 9 samples, and MCPA in 6 samples. The Guidelines for the protection of aquatic life were exceeded for MCPA and Trifluralin in one sample each. These occasional exceedances of Guideline values would not be expected to limit the suitability of the Whitemud River as an aquatic habitat.

Fecal coliform bacteria, measured as an indicator of contamination by fecal matter and potential presence of associated pathogens, was identified by Hughes (1999) as being abnormally high in Stony Creek just upstream of the Town of Neepawa. Fecal coliform bacteria in the rest of the Whitemud River and tributaries examined in the 1996-1998 study were, in most samples collected, below the Manitoba Water Quality Objective for recreational waters.

Dissolved oxygen in the Whitemud River is generally below saturation, and concentrations below the MWQSOGs for protection of cool-water aquatic life have been recorded at each monitoring station on the river during ice-covered and open-water seasons (**Appendix D**). Average dissolved oxygen concentrations in the river may be lower than those indicated by the monitoring data, as daytime concentrations tend to be higher than night-time concentrations during the growing season due to production of oxygen through photosynthesis during daylight hours. However, a lack of highly super-saturated values in the monitoring data suggest that wide diel fluctuations in dissolved oxygen are not prevalent in the Whitemud River, possibly due to limitations to primary productivity such as shade and bottom substrate. Sub-saturation of oxygen in the river is, in large part, due to degradation of organic matter, as organic carbon and biochemical oxygen demand concentrations are substantial in the river.

Although impacts to riparian vegetation have occurred in numerous areas, the river's narrow, defined channel and treed banks and riparian zones provide substantial shade to much of the river downstream of the Town of Neepawa. This shade appears to be sufficient to moderate water temperatures in the river during the summer, as temperatures recorded in the provincial water-quality monitoring datasets between the Town of Neepawa and the Town of Gladstone since 1990 have not exceeded 25°C (77°F). This temperature moderation helps to protect the river's habitat suitability for cool-water fish such as walleye and enhances oxygenation of the water.

Ammonia, which has variable toxicity to fish and aquatic invertebrates dependent upon water pH and temperature, exceeded the chronic-exposure Manitoba Water Quality Objective for the protection of aquatic life in 2 of 24 samples collected between 1990 and 1992 at Station MB05LLS010, downstream of the Town of Neepawa IWWTF effluent outfall, and in one sample collected in 1997 from MB05LLS044 near the community of Arden. These exceedances, and a general trend of elevated ammonia concentrations in the reach of the river downstream of the Town of Neepawa **(Appendix D**), likely reflected the discharge of ammonia-rich effluent from the IWWTF, which has been mitigated to some extent since 2001 by routing of the effluent through the Town of Neepawa municipal lagoon system, and is expected to be corrected further by the proposed upgrades to the IWWTF.

Ammonia exists naturally in surface waters as an excreted waste and degradation product of plant and animal tissues. It is consumed as a nutrient by plants and algae, which generally results in higher concentrations during winter than during the summer growing season, which is the pattern seen in the data from all monitoring stations on the Whitemud River (**Appendix D**). Another pattern observed in the Whitemud River water quality monitoring data (**Appendix D**) is the increase in nutrients (ammonia, nitrate and phosphorus) at the Town of Neepawa, followed by significant reductions in concentrations along the river further downstream during the growing season, suggestive of uptake by aquatic plants and algae.

Total phosphorus concentrations exceeded the narrative Manitoba Water Quality Guideline of 0.05 mg/L in most samples collected from the Whitemud River (**Appendix D**). However, concentrations were lower than in many prairie rivers with anthropogenic influences, particularly at Station MB05LLS011 upstream of the Town of Neepawa, where concentrations approached the Guideline in several samples collected in each season. Similar to ammonia and nitrate, phosphorus concentrations during the growing season typically declined downstream of inputs at the Town of Neepawa. However, whereas the nitrogenous compounds generally declined to growth-limiting concentrations at or downstream of the Town of Gladstone, phosphorus often approached, but rarely reached, limiting concentrations. These data suggest that, in reaches downstream of nutrient inputs at the Town of Neepawa, nitrogen limitation may occur currently in the Whitemud River, and that, if phosphorus loadings were reduced, plant and algae growth could become co-limited by both nutrients.

2.6.1 Effluent and Nutrient Loadings to the Whitemud River, at and Downstream of, Neepawa

The Whitemud River at Neepawa currently receives municipal wastewater generated by the Town of Neepawa and industrial wastewater generated by the Springhill Farms hog processing plant and treated by the Town of Neepawa. The existing IWWTF has been in operation since 1987, but, due to poor performance, its effluents since 2001 have been discharged to Cell #3 of the municipal lagoon system for additional treatment prior to being discharged to the river. Discharges of the industrial wastewater from the Town of Neepawa municipal Cell #3 occur approximately twice per year, with permission applied for by the Town of Neepawa and granted by Manitoba Conservation by way of Emergency Discharge Orders. Based on estimates provided by the Town of Neepawa, these discharges total approximately 150-200 ML per discharge event, with each event lasting approximately four weeks.

The Neepawa Municipal wastewater treatment system is designed to handle municipal wastewaters sequentially in Cells #1 through #3 of the lagoon system. However, due to use of Cell #3 for the industrial wastewater, municipal wastewater is now discharged directly to the Whitemud River from Cell #2. Discharge events occur approximately four times per year, with each event totalling approximately 100 ML and lasting approximately 2-3 weeks.

As per terms of Clean Environment Commission Order # 762VO, dated 1979, discharge from the municipal lagoon is permitted during the period of May 16 – October 31 when total coliform bacteria and BOD_5 concentrations are below 1500/100 mL and 30 mg/L, respectively. Monitoring of discharge rates and volumes is not required, and few data exist regarding the municipal effluent discharged to the Whitemud River. For the purposes of this assessment, analysis results from a single sample, collected from the municipal lagoon on May 13, 2008, have been used to estimate effluent concentrations of BOD, ammonia, organic carbon and nutrients in the effluents discharged from Cell #2 over the past several years. Industrial effluent discharged from Cell #3, however, is metered and sampled for analysis, which allows calculation of the loads of BOD and nutrients discharged to the Whitemud River since 2004. These loads, and the estimated yearly loads discharged to the river from Cell #2 in recent years, are provided in **Table 2.1**.

As discussed above and in **Appendix E**, nutrient concentrations in the Whitemud River are generally elevated just downstream of effluent discharges at the Town of Neepawa, but decrease along the river farther downstream, due to accumulation in sediments, uptake by plants and algae, and/or dilution. A comparison of loads in effluents and the river further shows that, though the Neepawa municipal and industrial effluents are discharged only during the open-water season (May-October), they each represent a significant increase to the total annual loads of BOD and nutrients carried by the Whitemud River, and that additional net loading in the reach between the Towns of Neepawa and Gladstone (approximately 110 km) is small. This comparison, summarized in **Table 2.2**, is approximate, as it estimates total yearly river loads based on monthly samples and discharge measurements, but it does indicate that the BOD and nutrient loads in the Neepawa municipal and industrial effluents are of the same order of magnitude as those in the river.

Table 2.1: Total Yearly Loads Of BOD, Organic Carbon, and Nutrients Discharged to the Whitemud River From the Neepawa Municipal Lagoon System, 2004-2007.

	BOD_5 kg/year	$cBOD_5$ kg/year	TSS kg/year	Ammonia kg/year	NO_3/NO_2 kg/year N	TKN kg/year	TN kg/year	TOC kg/year	DOC kg/year	TP kg/year
Industrial Effluent										
Industrial Effluent (Municipal Cell #3) [1, 2]										
2004	958		2 905	4 058	1 433	4 267	5 700			2 431
2005	1 142		9 113	2 379	394	3 035	3 429			2 915
2006	2 464		17 686	9 495	183	10 768	10 951			3 732
2007	2 829		5 948	10 135	1 229	9 590	10 819			3 259
Industrial Effluent Average (Municipal Cell #3)	1 849	2 310	8 913	6 517	810	6 915	7 725	6 510	5 250	3 084
Municipal Effluent										
Municipal Effluent (Municipal Cell #2) [3]	13 500	11 500	14 500	12 250	3	13 150	13 153	19 000	9 500	2 410

Notes:

1. Loading data calculated as means of data reported to Manitoba Conservation as per Emergency Discharge Orders, 2004-2007, except cBOD, DOC, TOC concentrations obtained from single sample collected May 13 2008; TP concentration estimated at 20 mg/L for summer discharges, measured May 2008 concentration (9.07 mg/L) for discharges that occurred in spring or fall.
2. 2004: May 11-31, July 16-August 22, October 5-25
   2005: June 15-July 10, September 6-October 12
   2006: June 9-28, September 15-28
   2007: June 27-July 16, July 17-October 31
3. Concentration data obtained from a single sample collected May 13 2008, prior to discharge. Flow data based on estimate of 500 ML/year provided by the Town of Neepawa.

Table 2.2: Average BOD and Nutrient Loads in Effluents Discharged to the Whitemud River and in the River Upstream and Downstream of Effluent Discharges.

		Neepawa Effluents			Whitemud River, 1990-1991		
		Municipal (Cell 2) [1]	Industrial (Cell 3) [2]	Total Effluents	Neepawa [3]	50 km Downstream (Keyes) [4]	100 km Downstream (Gladstone) [5]
OPEN-WATER SEASON (MAY-OCTOBER)							
Frequency		4 times/season 2-3 weeks each	2 times/season 4 weeks each				
BOD$_5$	kg/day	241	40	N/A	92	101	93
Ammonia	kg/day	219	140	N/A	2	10	1
Nitrate/Nitrite	kg/day N	0	17	N/A	2	4	0
Total Nitrogen	kg/day	235	166	N/A	32	57	44
Total Phosphorus	kg/day	43	66	N/A	3	10	6.2
TOTAL YEAR							
BOD$_5$	kg/year	13 500	1 849	15 349	40 368	100 335	22 177
Ammonia	kg/year	12 250	6 517	18 767	4 484	9 965	705
Nitrate/Nitrite	kg/year	3	810	813	4 838	19 367	1145
Total Nitrogen	kg/year	13 153	7 725	20 878	24 510	74 383	12 412
Total Phosphorus	kg/year	2 410	3 084	5 494	3 157	15 557	1 481

Notes: N/A Municipal and industrial effluents (from Municipal Cell 2 Cell 3, respectively) are not discharged simultaneously (pers. comm. Town of Neepawa)

1. Concentration data obtained from a single sample collected May 13 2008, prior to discharge. Flow data based on estimate provided by the Town of Neepawa.
2. Loading data calculated as means of data reported to Manitoba Conservation as per Emergency Discharge Orders, 2004-2007, except cBOD, DOC, TOC concentrations obtained from single sample collected May 13 2008; TP concentration estimated at 20 mg/L for summer samples, measured 2008 concentration (9.07 mg/L) for spring & fall discharge periods.
3. Mean of monthly data, based on flow-weighted average of Boggy Creek and Stony Creek data, with correction of flows for Franklin Creek drainage. No data for November and December 1991.
4. Mean of monthly data. No data for November and December 1991.
5. Mean of monthly data. No data for January, April, July, October 1990 or January, April, July, October-December 1991.

2.7 HYDROGEOLOGY

According to the Province of Manitoba, Department of Natural Resources, Water Resources Branch Bedrock Aquifer map, there are no bedrock aquifers at depths of less than 150 m (492 ft) within the study area. According to the same source, the Sand and Gravel Aquifer map indicates that in the study area, there are multiple sand and gravel aquifers present which can be described as thin unconfined sand aquifers which will yield less than 0.5 L/s (0.018 cfs). The water quality in these aquifers can be defined as fair to good and are more or less continuous over the area (Rutulis, 1986a, 1986b).

According to the Groundwater Availability Study of the Neepawa Area, the study area falls in the minor overburden aquifer areas with overburden thickness of approximately 50 m (164 ft). The potentiometric surface elevation in the study area is approximately 360 m.a.s.l (1,181 ft). and groundwater flow direction is generally in an easterly direction towards Lake Manitoba (Province of Manitoba, 1988). Based on a geotechnical investigation at the existing IWWTF site, the groundwater had an apparent flow in a northerly direction.

The surface deposits in the Neepawa area are of a shallow surface sand hydrogeological unit. The sand forms a thin and extensive shallow sand aquifer. Underlying the sand is a thick clay with sand and gravel aquifers interbedded in the till underlying the clay. The sand and gravel aquifers underlying the clay are generally not potable. Therefore the thin shallow sand aquifer is generally the only source of potable groundwater in the area. The shallow sand aquifers recharge by precipitation with the majority of the recharge occurring during the spring snow melt and rains. The groundwater quality is good to excellent in the shallow sand aquifers and in general the groundwater supply is abundant (Manitoba Conservation, 1985).

According to the Province of Manitoba’s groundwater pollution hazard map, the IWWTF site falls within a designated groundwater pollution hazard area, as shown in **Figure 2.9** and as such is sensitive to groundwater contamination.

Groundwater monitoring conducted near the existing IWWTF site in 2007 indicated limited impacts to the shallow groundwater in the vicinity of some of the treatment cells. Recommendations resulting from the investigation included continued monitoring and ground truthing for downstream users. The Town of Neepawa has reported the findings of the study to Manitoba Conservation with the expectation that the upgrades at the IWWTF will result in the reduction of apparent groundwater impacts as would be demonstrated through the recommended continued monitoring program.

2.7.1 Extent of Groundwater Use

Based on a review of Manitoba Water Stewardship’s Groundwater Management Section 2007 well records, an estimated 115 registered wells exist within a 3 km (1.9 mi) radius of the proposed IWWTF site, including 4 registered wells with unknown exact locations. According to the well records, of the 115 registered wells, 81 are registered as production wells, 26 are registered as test wells and 8 are registered as observation wells. Within a 1.5 km (0.9 mi) radius of the site there are 53 registered wells according to the same source. The well records indicate that of the 53 registered wells, 33 are registered as production wells, 12 are registered as test wells and 8 are registered as observation wells. A summary of the water use of the production wells within a 3 km (1.9 mi) and 1.5 km (0.9 mi) radius of the proposed site is indicated in **Table 2.3**.

Table 2.3: Number of Registered Production Wells by Water Use Within 3 km and 1.5 km of the IWWTF Site[1]

Distance to IWWTF	Domestic	Livestock	Domestic & Livestock	Municipal	Other	No water use listed	Total
3.0 km [2]	42	12	24	1	2	0	81
1.5 km	14	8	10	0	1	0	33

Notes:

1. Manitoba Water Stewardship, Groundwater Management Section (2007).
2. Includes wells within 1.5 km (0.9 mi) of IWWTF site.

As indicated in **Table 2.3**, the majority of the production wells in the 3 km (1.9 mi) study area are intended for domestic water use. The depth from the ground surface to the perforated well section in which groundwater can enter the wells within the 1.5 km (0.9 mi) radius of the site ranges from 1.8 to 34.7 m (6 to 113.9 ft) below the ground surface. The shallowest well within the 1.5 km (0.9 mi) radius has a bottom depth of 5.8 m (19 ft) below the ground surface.

The approximate locations of the registered wells within a 3 km (1.9 mi) radius of the site are shown on **Figure 2.10**. Based on the review of Manitoba Water Stewardship's Water Branch 2007 well records, the closest wells to the proposed IWWTF site are located in the southwest quadrant of 35-14-15W. There are 8 registered wells in the southwest quadrant of 35-14-15W all of which are designated as observation wells and registered to MWSB Hog Plant which is actually the Springhill Farms pork processing facility. According to the well logs, the soils in the vicinity of the observation wells consist of brown sand extending to approximately 5.5 m (18 ft) below the ground surface. In some of the observation wells, a clay layer was encountered in the sand with a thickness ranging from 0.2 to 1.2 m (0.5 to 4 ft). The thickness and presence of the clay layer was not consistent in the observation wells. Below the clay layer, sand was encountered which was underlain in some of the boreholes by silt or silt and clay at a depth of approximately 8.5 m (28 ft) below the ground surface. In the observation wells, groundwater was encountered at depths ranging from 0.9 to 4.3 m (3 to 14 ft) below the ground surface.

It is not the intention of the Town of Neepawa to construct supply wells on the property or to withdraw or utilize any encountered groundwater from the area. All water to be utilized at the proposed site will be provided by the Town of Neepawa through their existing distribution network.

2.8 AMBIENT AIR QUALITY

No ambient air quality data for the proposed IWWTF site exists, as there is no continuous air quality monitoring at the proposed location. However, Manitoba Conservation has monitoring stations located within the City of Winnipeg, the City of Brandon, the City of Flin Flon, and the Town of Thompson. In this case, the City of Brandon station, located at Assiniboine Community College, was chosen as most representative of the IWWTF as it was geographically closest to the IWWTF site and provides a general indication of air quality in the area. The air quality monitoring station location in relation to the IWWTF site is shown in **Figure 2.11**.

Air Quality data for the City of Brandon from 1995 to 2006 was obtained from Manitoba Conservation (2008). The data included the following parameters; Ammonia (NH_3), Nitric Oxide (NO), Nitrogen Dioxide (NO_2), Nitrogen Oxides (NO_X), Oxidants Ozone (O_3), Inhalable Particulate (PM_{10} and $PM_{2.5}$), and others (see **Appendix F**). **Table 2.4** provides a general summary of the average annual air quality data based on the data provided by Manitoba Conservation.

Table 2.4: Estimated Ambient Air Quality for the Brandon Area [1]

Name of Pollutant	Data Source	Units of Measurement	Averaging Period	Average Annual Parameter Concentration
NH_3	Brandon Assiniboine Community College	ppm	1995-2006	0.01
TSP	Brandon 1104 Princess Avenue	µg/m^3	1995-1999	37
PM_{10}	Brandon Assiniboine Community College	µg/m^3	1997-2006	21.0
$PM_{2.5}$	Brandon Assiniboine Community College	µg/m^3	2001-2006	5.4
NO_2	Brandon Assiniboine Community College	pphm	1995-2006 (excluding 1996)	0.66
O_3	Brandon Assiniboine Community College	pphm	1995-2006	2.68

Note:
1. Manitoba Conservation, Air Quality Section (Manitoba Conservation, 2008).

2.9 CLIMATE

The Neepawa area is located in an area described as a continental climate. It receives 516.3 mm (20.33 in) of precipitation per year, with 405.7 mm (15.97 in) as rainfall and 110.7 mm (4.36 in) as snow (Environment Canada, 2007a). The Neepawa meteorological station measures temperature and precipitation while the closest meteorological station that measures wind speed and direction is the Brandon station. **Table 2.5** shows the monthly temperature and precipitation for the Neepawa station and the monthly wind speed and direction for the Brandon station over the normal year. **Table 2.6** shows other relevant weather parameters for the Town of Neepawa.

Table 2.5: Climatic Data for the Town of Neepawa (1971-2000)
Latitude 50° 13' N Longitude 99° 28' W Elevation 358.10 m
And the City of Brandon (1971-2000)
Latitude 49° 55' N Longitude 99° 57' W Elevation 409.40 m[1]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Yr
Daily Average Temperature (°C)[2]	-17.1	-13.3	- 6.1	3.4	11.5	16.5	18.9	17.9	11.9	5.2	-5.2	-14.1	2.5
Precipitation (mm)[2]	20.1	14.6	24.4	35	58.4	79.5	82	70.4	57.9	31.3	20.8	22	516.3
Average Wind Speed (kph)[3]	15.6	15.2	15.5	16.5	16.8	15.3	12.8	13.1	15.1	15.6	14.9	15.5	15.2
Most Frequent Wind Direction[3]	W	W	W	NE	NE	W	W	W	W	W	W	W	W
Days With Winds ≥ 52 km/hr[3]	0.9	0.4	0.6	1.1	1.4	1	0.7	0.7	0.9	1.2	0.9	0.7	10.7
Days With Winds ≥ 63 km/hr[3]	0.2	0	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.2	3

Note:

1. Data obtained from Environment Canada (2007a, 2007b).
2. Neepawa meteorological station.
3. Brandon meteorological station.

Table 2.6: Other Weather Parameters for Neepawa, Manitoba

Weather Parameter	Value
Last Spring Frost (0°C)[1]	May 19-May 24
First Fall Frost (0°C)[1]	Sept 16- Sept 21
Frost Free Period (over 0°C)[1]	115-125 days
Average Gross Evaporation[2]	750-800 mm
Extreme Maximum Temperature (°C)[3]	37.5 (Aug, 1988)
Extreme Minimum Temperature (°C)[3]	-42.5 (Feb, 1996)
Extreme Daily Rainfall (mm)[3]	140.2 (Jul, 1987)
Maximum Hourly Wind (kph)[4]	95 (Jun, 2002)
Maximum Gust (kph)[4]	139 (Jul, 1981)

Notes:

1. Data obtained from Manitoba Agriculture, Food and Rural Initiatives (1999).
2. Data obtained from Agriculture and Agri-Food Canada (2007).
3. Data obtained from Environment Canada Neepawa meteorological station (2007a).
4. Data obtained from Environment Canada Brandon meteorological station (2007b).

The locations of the Neepawa and Brandon meteorological stations where the climate data was recorded are indicated on **Figure 2.11**.

2.10 VEGETATION AND WILDLIFE

2.10.1 Natural Vegetation

The proposed project region is located in the Prairies ecozone and the Aspen Parkland ecoregion. Vegetation within the Prairies ecozone generally includes trembling aspen, balsam poplar and intermittent grasslands. The natural grasslands typically consist of spear, wheat and blue gamma grass. Sagebrush is also abundant while in drier areas of the Prairies ecozone, yellow cactus and prickly pear occur. Vegetation in the Aspen Parkland ecoregion is considered to be a transition between the boreal forests in the north and the grasslands to the south. The majority of the Aspen Parkland ecoregion has been altered by agriculture, however in its natural state, it consists of trembling aspen, oak groves, mixed tall shrubs and intermittent grasslands. (Environment Canada, 2008a)

According to Rowe (1972), the study area is located within the Aspen-Oak forest of the Boreal Forest Region. This area is characterized by groves of trees, interspersed with grasslands. The dominant tree species is aspen, while balsam polar is common in wet areas and bur oak will sporadically occur along rivers. Other common species include white elm, Manitoba maple, eastern cottonwood, and possibly basswood and black ash. The capability for forestry in the study area including the facility site is rated as having moderately severe and severe limitations to the production of forestry (Class 5 and 6) as shown in **Figure 2.12.** One area west of the proposed site is rated as an unclassified area – unmapped area (Class 8) (Canada Land Inventory, 2000b).

A general terrestrial survey of the existing IWWTF site and lands to the immediate north, south, east and west was completed by Green Spaces Environmental Consulting on April 22 and 23, 2008. More recently, a specific survey of the presently proposed IWWTF site and proposed access road was conducted on June 14, 2008 (these reports are included in **Appendix G**). The following paragraphs summarize the findings of the vegetation survey work.

The proposed IWWTF site was examined by observing two hundred one-square-metre plots that were randomly sampled. The site is located in the centre of a hay meadow composed primarily of Alfalfa (Medicago sativa) (observed in 62% of the plots) and species of Blue Grass (Poa spp.) (observed in 96% of the plots). The site also includes a sand ridge running roughly north-south located along the eastern extremity of the project area that is suspected to have formed over a former fence line. In addition to the sand ridge, the site includes a clump of plants, known locally as a “bush”, growing in the middle of the hayfield. This area includes two dominant willow species, the Beaked Willow (Salix bebbiana) and Pussy Willow (Salix discolor). A list of the observed plant species identified during the visit is included with the report in **Appendix G**.

The existing discharge location of the IWWTF outfall lies to the northwest of the proposed IWWTF site. Its discharge point is to a small shallow oxbow meandering through the low area adjacent to the east side of the Whitemud River. The outfall is generally surrounded by very sandy terrain. At the time of the visit (April 2008) the oxbow contained very little water but was bordered by an extensive tract of sedges which gradually gave way to native grasses as the elevation increased. The oxbow, at its lowest elevation, had dense stands of Cattail in it, while the native grasses were interspersed with shrubs and some trees on the slopes. Species of willows were found to be located in the general vicinity of the outfall along the Whitemud River along with Bur Oak, Balsam Poplar, Manitoba Maple, White Birch and some young Aspen Poplar and pine trees amongst other species.

None of the plant species observed within the project area would be considered “rare or endangered” on a Provincial or Federal level.

2.10.2 Wildlife

The Aspen Parkland ecoregion typically includes major breeding habitat for waterfowl. Other species that may be found in the ecoregion include white-tailed deer, coyote, snowshoe hare, cottontail, red fox, northern pocket gopher, Franklin's ground squirrel, and bird species like sharp-tailed grouse and black-billed magpie. (Environment Canada, 2008a)

The capability for ungulates in the study area, including the proposed IWWTF site, is rated from having very slight limitations to moderately severe limitations to the production of ungulates (Class 2, 3, 4, and 5). One area west of the proposed site is rated as an unclassified area – unmapped area (Class 8). The proposed IWWTF site itself is rated as having very slight limitations to the production of ungulates (Class 2), as shown in **Figure 2.13** (Canada Land Inventory, 2000c).

The capability for waterfowl in the study area, including the proposed facility site, is rated from having moderately severe limitations to the production of waterfowl to such severe limitations that almost no waterfowl are produced (Class 5, 6 and 7). One area west of the proposed site is rated as a special case - unmapped area (Class 8). The proposed IWWTF site itself is rated as having such severe limitations that almost no waterfowl are produced (Class 7) as shown in **Figure 2.14** (Canada Land Inventory, 2000d).

A general terrestrial survey was conducted at the site of the existing IWWTF and lands to the immediate north, south, east and west by Green Spaces Environmental Consulting on April 22 and 23, 2008 (report included in **Appendix G**). A specific site visit was also conducted on June 14, 2008 at the proposed location of the IWWTF. The following paragraphs provide some detail of the wildlife observations from the terrestrial surveys.

A total of 31 bird species were recorded in the general vicinity of the proposed IWWTF site (a list of the species is included in **Appendix G).** With respect to terrestrial fauna, the proposed IWWTF location contained a number of mounds of earth produced by Northern Pocket Gophers (Thomomys talpoides). There was also evidence that American Badger (Taxidea taxus), White-tailed Deer (Odocoileus virginianus) and Thirteen-lined Ground Squirrels (Spermophilus tridecemlineatus) occupied the site.

All of the plants, birds and mammals recorded in the proposed project area are doing well in the general Neepawa area and, although any loss of habitat has negative local implications, none of the species in the project area are deemed “rare and/or endangered” by provincial and federal governmental officials. Consequently, the development of an IWWTF in this location does not raise any specific environmental concerns regarding plants, birds and mammals.

2.10.3 Protected Areas

The closest protected area to the project site is the Whitemud Watershed Wildlife Management Area, located 12 km (7.5 mi) to the southeast of the site. The Whitemud Watershed Wildlife Management Area provides important habitat for deer, upland game birds, amphibians and other wildlife. In the Gladstone area, vegetation in the Wildlife Management Area includes aspen forest, mixed-grass prairie and formerly cultivated areas seeded to grasses or forage. (Manitoba Conservation, Wildlife Ecosystem Protection Branch, 2007)

2.11 AQUATIC RESOURCES

The Whitemud River provides year-round habitat for a number of aquatic species as detailed in **Appendix D**. Instream vegetation varies spatially and temporally based on season, bottom substrate and flow conditions. During field studies in 2007, the main channel did not develop extensive vegetative cover, but slower moving back eddies and channel margins reached as much as 80% cover from emergent plants.

Fish surveys in 2007 in the Whitemud River near the Town of Neepawa indicated the presence of northern pike, fathead minnows, white suckers and emerald shiners, with numerous other species known or suspected to inhabit the river (**Appendix D**). Several fish species in the river are sought after for recreational fishing, which occurs to some extent along the length of the river, although the most concentrated recreational fishing occurs near Lake Manitoba. No subsistence or commercial fishing occurs on the Whitemud River, however approximately 190 km downstream on Lake Manitoba, these activities do occur. The use of habitats as far upstream as the Town of Neepawa by Lake Manitoba fish populations is likely limited by barriers to upstream fish passage along the river.

2.12 PROTECTED SPECIES

To determine the Federal Species at Risk Act Schedule 1 species that could potentially occur in the general project region, a search using Environment Canada's Species at Risk mapping tool was conducted. A search of the provincially listed Manitoba Endangered Species Act species using NatureServe Explorer was also completed to determine the provincially listed species that may occur in the project region. Manitoba Conservation – Wildlife and Ecosystem Protection Branch distribution maps were also used where possible to determine provincially listed species that may occur in the project region. Species at risk that may occur in the general project region for which no suitable habitat type was available at the site were not included. The search results found that there is potential for several at risk species to occur in the general project region which are listed in the following table.

Table 2.7: Federally and Provincially Listed Species that May Occur in the Project Region

Species Common Name	Species Scientific Name	Federal SARA Species Status	Manitoba Conservation Endangered Species Act Status
Loggerhead Shrike excubitorides subspecies	*Lanius ludovicianus excubitorides*	Threatened	Endangered
Small White Lady's-slipper	*Cypripedium candidum*	Endangered	Endangered
Baird's Sparrow	*Ammodramus bairdii*	Not ranked	Endangered
Uncas Skipper	*Hesperia uncas*	Not ranked	Endangered
Buffalo Grass	*Buchloe dactyloides*	Threatened	Threatened

Fish presence studies were completed as part of the aquatic resources assessment. One fish species known or suspected to inhabit the Whitemud River has been designated a status of Special Concern by the Committee On the Status of Endangered Wildlife In Canada. This species, the chestnut lamprey (*Ichthyomyzon castaneus*) has not been designated for specific protection under the federal *Species At Risk Act.* Currently no fish species are listed under the Manitoba Conservation *Endangered Species Act*.

2.13 LOCAL ECONOMY

As of 2006, the main components of the economy of the Town of Neepawa are health and education (22.6%), wholesale and retail trade (15.7%), other services (23.3%), manufacturing and construction industries (16.1%), business services (10.8%), and agriculture and resource-based industries (7.9%) (Statistics Canada, 2007a). The largest public sector employer is the Town of Neepawa with 40 employees. The largest private sector employers are Neepawa Food Processors with an unknown number of employees, Springhill Farms with 368 employees, Prairie Forest Products with 55 employees, Touchwood Park Association Industries with 50 employees, and McSweeney's Fine Foods with 12 employees (Manitoba

Intergovernmental Affairs, 2000a). Of the top five employers in the public and private sector, the major employers in the Town of Neepawa are from the private sector.

Table 2.8 highlights the labour force participation rate and unemployment rate for incorporated municipalities and First Nation communities nearest the study area, as compared to the Province as a whole based on 2006 Statistics Canada Census data.

Table 2.8: Unemployment Rate and Labour Force Participation Rate

Community	Unemployment Rate [1]	Labour Force Participation Rate [1]
Incorporated Municipalities		
Town of Neepawa	2.3%	57.7%
R.M. of Langford	7.6%	73.6%
R.M. of Lansdowne	0%	86.4%
R.M. of Rosedale	2.1%	73.6%
First Nation Communities		
Rolling River	16.7%	66.7%
Manitoba	**5.5%**	**67.3%**

Notes:

1. Derived from Statistics Canada Census Data, (Statistics Canada, 2007a, 2007b, 2007c).

2.14 SETTLEMENT AND POPULATION

2.14.1 Town of Neepawa

The provincial boundary of Manitoba did not include the Neepawa area when the boundary was first established in 1870 and the Neepawa area was considered part of the Northwest Territories. When the provincial boundary was extended in 1881, the Neepawa area became part of the Province of Manitoba. The Neepawa area was settled by a wave of immigrants from the British Isles followed by groups of Eastern European settlers from 1870 and thirty years thereafter. The Town of Neepawa was incorporated on January 2, 1883. The name Neepawa has its origin in the Cree word for plenty (Manitoba Intergovernmental Affairs, 2000a).

As of 2006, the Town of Neepawa had an estimated population of 3,298 (Statistics Canada, 2007a), down 0.8 percent from the 3,325 given in the 2001 Census data. Between 2001 and 2006, the population decrease in the Town of Neepawa was notable when compared to the Province as a whole, which had a 2.6 percent increase between 2001 and 2006.

Town of Neepawa Services

Services provided in the Town of Neepawa include a fire department and a Royal Canadian Mounted Police (RCMP) service. Neepawa also has 911 emergency services (Manitoba Intergovernmental Affairs, 2000a).

Health care facilities in the Town of Neepawa include: the Neepawa Memorial Hospital (38 beds), 3 medical clinics and 1 personal care home. The Town of Neepawa provides potable water to residents from Lake Irwin. The water is treated with lime softening, filtration and chlorination. Fluoride is also added to the water prior to distribution. Water is distributed to residents from a water tower and holding tank with an approximate storage capacity of 3.5 million litres. Wastewater is treated in a three-cell lagoon system located in the eastern portion of the Town (Town of Neepawa, 2005a).

The Neepawa area is served by Evergreen Environmental Technologies, which is the regional landfill located west of the Town of Neepawa (Town of Neepawa, 2005a). The landfill is a regional facility serving the R.M.s of Elton, Langford, Minto, North Cypress, and Odanah as well as the Town of Carberry, Town of Minnedosa and Town of Neepawa. The landfill has an estimated life span of approximately 100 years. Hazardous wastes generated in Neepawa are handled by one of eight hazardous waste haulers within the Province, with the nearest Licensed Hazardous Waste Disposal facility located in Letellier, Manitoba, 75 km south of the City of Winnipeg (Manitoba Intergovernmental Affairs, 2000a).

2.14.2 Rural Municipality of Langford

The R.M. of Langford surrounds the southern portion of the Town of Neepawa. As of 2006, the R.M. had an estimated population of 787 (Statistics Canada, 2007a), up 0.4 percent from the estimated population of 784, provided in the 2001 Census data. The average elevation of the municipality is 390 m.a.s.l. (1,279 ft) and the municipality covers an area of approximately 546 km^2 (218 mi^2) (Manitoba Intergovernmental Affairs, 2000b). The municipality boundary is presented in **Figure 2.15**.

Rural Municipality of Langford Services

The R.M. is accessible by Provincial Highway No. 5 and 16 and Provincial Road 465. There are no municipal sewers or public water systems for the R.M. of Langford. Police services for the municipality are provided by the RCMP while fire and 911 emergency response services are also available. The closest health care facilities are located in the Town of Neepawa, as described previously in **Section 2.14.2**. The residents of the R.M. of Langford depend on the Town of Neepawa for educational services (Manitoba Intergovernmental Affairs, 2000b). The R.M. Langford is serviced by the Evergreen Environmental Technologies regional landfill, as described in **Section 2.14.2**.

2.14.3 Rural Municipality of Lansdowne

The R.M. of Lansdowne is located to the northeast of the Town of Neepawa. The average elevation of the municipality is approximately 331 m.a.s.l (1,086 ft) and the municipality covers an approximate area of 746 km^2 (298 mi^2). The municipality boundary is presented in **Figure 2.16** (Manitoba Intergovernmental Affairs, 2000c).

As of 2006, the R.M. of Lansdowne had an estimated population of 750 (Statistics Canada, 2007b), down 14.5 percent from the 877 given in the 2001 Census data. This decrease in population in the municipality is significant when compared to the Province as a whole which had an increase of 2.6 percent in population between 2001 and 2006.

Rural Municipality of Lansdowne Services

The R.M. of Lansdowne is accessible by Provincial Highway No. 16 and Provincial Road Nos. 352, 265 and 462. The municipality is served by the RCMP as well as fire and 911 emergency response services. The closest health care facilities are located in the Town of Neepawa, as described in **Section 2.14.2**. Educational services are provided by the Town of Neepawa. The municipality is serviced by the Evergreen Environmental Technologies regional landfill, as described in **Section 2.14.2**. There are no municipal water supply or sewage treatment facilities in the municipality, however potable groundwater is obtained from private wells and sewage disposal occurs in septic fields (Manitoba Intergovernmental Affairs, 2000c).

2.14.4 Rural Municipality of Rosedale

The R.M. of Rosedale borders the northern portion of the Town of Neepawa. The average elevation of the municipality is approximately 504 m.a.s.l (1,652 ft) and covers and approximate area of 858 km^2 (343 mi^2). The municipality boundary is presented in **Figure 2.17** (Manitoba Intergovernmental Affairs, 2000d).

As of 2006, the R.M. of Rosedale had an estimated population of 1,658 (Statistics Canada, 2007b), up 3.8 percent from the 1,598 given in the 2001 Census data.

Rural Municipality of Rosedale Services

The R.M. of Rosedale is accessible by Provincial Highway No. 5 and Provincial Road Nos. 261, 265, 352, 357 and 471. The municipality is served by the RCMP as well as fire and 911 emergency response services. The closest health care facilities are located in the Town of Neepawa, as described in **Section 2.14.2**. Educational services are provided by the communities of Birnie and Eden and the Town of Neepawa. The municipality is serviced by the Evergreen Environmental Technologies regional landfill, as described in **Section 2.14.2**. There are no municipal water supply or sewage treatment facilities in the municipality (Manitoba Intergovernmental Affairs, 2000d).

2.14.5 Rolling River First Nation Community

The closest First Nation Community to the study area is the Rolling River First Nation located approximately 46 km (28.6 mi) northwest of the IWWTF site (Indian and Northern Affairs Canada, 2004). The Rolling River First Nation is home to some 336 residents (Statistics Canada, 2007c) with an experienced labour force of 145 people.

Table 2.9 indicates the total population, both on and off the reserve, of the Rolling River First Nation Community. The data was derived from the Department of Indian Affairs and Northern Development First Nation Profiles (2008).

Table 2.9: Total Population of the Closest First Nations Community in Proximity to the IWWTF Site[1]

Community	Indian and Northern Affairs Canada (2008)
Rolling River	
On-Reserve	501
Off-Reserve	426
Total	927

Notes:
1. On-Reserve - includes registered males and females on own reserve.
2. Off-Reserve - includes registered males and females on other reserves and off reserves.

Rolling River First Nation Community Services

Services in the Rolling River First Nation Community services are as shown in **Table 2.10**.

Table 2.10: Services Available in the Rolling River First Nation Community[1]

Community	School	Fire Department	Nearest Hospital	Sewer & Water	Police
Rolling River First Nation	K4-S4 in Erikson[2]	Fire Pumper Truck, Ancillary Equipment, and a 12-man Trained Volunteer Fire Department	Erickson	Chlorinated well water is delivered via water truck to cisterns in houses, four houses are connected to individual wells, three houses have no water service. Sewage disposal is by septic fields, 10 houses have no sewage service	RCMP Minnedosa

Notes:
1. Source Indian and Northern Affairs Canada (2004).
2. K4 indicates nursery school and S4 indicates final year of high school.

2.14.6 Age Characteristics of Area Population

Table 2.11 presents the age structure of incorporated municipalities and the nearest First Nation Community in or near the study area. In general, the age structure of the R.M.s of Langford, Lansdowne and Rosedale is similar to the Province as a whole. The Town of Neepawa has less younger and middle aged people, and more older people (65 years or over) as compared to the Province as a whole. In contrast, the age structure of the First Nation Community is significantly younger than the incorporated municipalities or the Province. People 65 years and older are generally three to four times fewer in this First Nations Community.

Table 2.11: Age Characteristics of Town of Neepawa and Surrounding Rural Municipalities and First Nation Community in and Near the Study Area, Compared to Manitoba[1]

Location	Age		
	0-19 years	**20-64 years**	**65 years or over**
Town of Neepawa	21.2%	51.2%	27.3%
R.M. of Langford	28.6%	59.7%	12.7%
R.M. of Lansdowne	24.7%	58.7%	15.3%
R.M. of Rosedale	31.6%	54.3%	13.3%
Rolling River	40.2%	52.1%	6.0%
Manitoba	**26.9%**	**59.0%**	**14.1%**

Notes:
1. Derived from Statistics Canada (2007a, 2007b, 2007c).
2. Percentages are approximate only.

2.15 TRANSPORTATION

The Town of Neepawa is serviced by major highways, the CP Railway and air via a runway that is able to accommodate air ambulance and small jets. Neepawa is also serviced by Grey Goose and Greyhound Bus lines (Town of Neepawa, 2005a).

Major system highways that the Town of Neepawa is connected to include; Provincial Highway No. 16 (the Yellowhead Highway) and Provincial Highway No. 5. Provincial Highway No. 5 provides connections with the United States, while Provincial Highway No. 16 provides connections to Saskatchewan and Provincial Highway No. 1 (the TransCanada Highway). The TransCanada Highway provides direct connections to all major urban centers in Canada.

The major roads surrounding the IWWTF site location include Provincial Highway No. 16 to the south, Provincial Highway No. 5 to the west and Provincial Road No. 352 to the east.

Table 2.12 provides the Average Annual Daily Traffic (AADT) load for these Provincial Highways.

Table 2.12: AADT Counts in the Vicinity of the IWWTF Site (2008)[2]

Road	Count Location	A.A.D.T.
Provincial Road No. 352	North of intersection of Provincial Road No. 352 and Provincial Highway No. 16	400
Provincial Road No. 352	South of intersection of Provincial Road No. 352 and Provincial Highway No. 16	110
Provincial Highway No. 5	North of intersection of Provincial Highway No. 5 and Provincial Highway No. 16	2,150
Provincial Highway No. 5	South of intersection of Provincial Highway No. 5 and Provincial Highway No. 16	1,250
Provincial Highway No. 16	East of intersection of Provincial Highway No. 16 and Provincial Road No. 362	3,180
Provincial Highway No. 16	West of Provincial Road No. 352 and east of Provincial Highway No. 5	3,260
Provincial Highway No. 16	West of intersection of Provincial Highway No. 5 and Provincial Highway No. 16	3,460

Notes:

1. A.A.D.T. = Average annual daily traffic counts.
2. Obtained from Manitoba Highway Traffic Information System (2008).

Currently the only traffic going to and from the existing IWWTF is employee traffic which is estimated at approximately two staff trips per day.

2.16 CULTURAL SETTING

2.16.1 Heritage Resources

The Heritage Resources Branch - Archaeological Assessment Services Unit of Manitoba Culture, Heritage, Tourism and Sport was contacted to determine the potential for impact to heritage resources in the proposed areas of the new IWWTF. According to the branch records, the potential to impact significant heritage resources is low, and the Heritage Resources Branch has no concerns with the project. A copy of the correspondence from Heritage Resources Branch is included in **Appendix H**.

2.17 LAND USE AND DEVELOPMENT CONTROLS

2.17.1 Regional Land Use

Within the regional study area (10 km (6.2 mi) radius surrounding the proposed site), an array of urban and rural land uses are apparent. Land use planning and development controls are generally within the purview of the Town of Neepawa, R.M. of Langford, R.M. of Lansdowne and R.M. of Rosedale pertaining to their respective areas. There are currently no First Nation Reserve lands located within the 10 km (6.2 mi) radius surrounding the proposed site, where development controls would not apply in any event.

There are no Provincial parks located within the R.M.s of Langford, Lansdowne or Rosedale. However, Riding Mountain National Park has existed directly west of the R.M. of Rosedale since obtaining national park status in 1930.

Within the R.M. of Langford and the R.M. of Lansdowne, there is a Prairie Farm Rehabilitation Administration Community Pasture located to the southeast of the Town of Neepawa. According to the Neepawa and Area Planning District Development Plan, the Community Pasture was established in 1948 and covers and area of approximately 8,798 ha (21,740 acres) and is used as an off-farm grazing site for local residents in the community. There is also a wildlife management area located to the north of the community pasture within the R.M. of Langford.

The overall goals of the Neepawa and Area Planning District are apparent from comments in their Development Plan as shown in the following excerpt:

> *"This Development Plan has the overall goal or objective of enhancing the physical, socio-economic, and environmental opportunities for the people of the Planning District. Inherent in this goal are orderly and efficient development, equality, enhancement or aesthetics and the environment, and the principle of public involvement."*

2.17.2 Local Land Use

Within the local study area (3 km (1.9 mi) radius from the proposed IWWTF site), the R.M. of Langford occupies the largest portion of the 3 km (1.9 mi) radius study area (approximately 42.4 %) while approximately 35.2% falls within the Town of Neepawa, 19.5% falls within the R.M. of Rosedale and 3% falls within the R.M. of Lansdowne (**Figure 1.1**). Use and development of land within the local study area is governed by the Neepawa and Area Planning District Development Plan and the Town of Neepawa, R.M. of Langford, R.M. of Lansdowne, and R.M. of Rosedale Zoning By-Laws. The Development Plan and Zoning By-laws include an array of measures designed to regulate and control the development and use of land and buildings.

The current zoning of the proposed IWWTF site and surrounding lands are illustrated in **Figure 2.1**, with the related zoning designations described in **Table 2.13**. The predominant designation of land within the 3 km (1.9 mi) radius study area is zoned AG 80 which is an Agricultural General Zone.

Table 2.13: Zoning Designation Within the 3 km study area

Zoning Designation	Description
R.M. of Rosedale	
AR	Agricultural Restricted Zone
R.M. of Langford	
AG 80	Agricultural General Zone
AC 80	Agricultural Conservation Zone
SRR	Seasonal Recreation Residential Zone
R.M. of Lansdowne	
AG 80	Agricultural General Zone
Town of Neepawa	
AR	Agricultural Restricted Zone
AR-C	Agricultural Restricted – Commercial Zone
AR-R	Agricultural Restricted – Residential Zone
AR-O	Agricultural Restricted – Open Space Zone
CH	Commercial Highway Zone
CC	Commercial Central Zone
I	Institutional Zone
O	Open Space Zone
MH	Industrial Heavy Zone
RM-1	Residential Multiple-Family Zone
RM-2	Residential Multiple-Family Zone
RR2	Residential Rural Zone
RS	Residential Single-Family Zone
RS-U	Residential Single-Family Unserviced
RT	Residential Two-Family Zone

2.17.3 Dwellings and Businesses

According to Statistics Canada 2006 census results, there were a total of 3,298 residents living in 1,587 occupied private dwellings in the Town of Neepawa (Statistics Canada, 2007a). The R.M. of Langford had a total population of 787 living in 291 dwellings (Statistics Canada, 2007a) while the R.M. of Lansdowne had a total population of 750 residents living in 291 dwellings, and the R.M. of Rosedale had a total population of 1,658 residents in 584 dwellings (Statistics Canada, 2007b).

To determine the number of dwellings within a 3 km (1.9 mi) radius of the proposed IWWTF site, digital air photos, topographic information and land ownership maps were examined. Digital air photos from 1993 (scale 1:60,000) and digital topographic mapping (1:20,000) were obtained from Manitoba Land Initiative for the area (Wahl, 2008; Manitoba Land Initiative, 1993a, 1993b, 1993c, 1993d). Land ownership maps from 2006 for the R.M.s of Langford, Lansdowne, and Rosedale were also examined (Rural Municipality of Langford, 2006; Rural Municipality of Lansdowne, 2006; and Rural Municipality of Rosedale, 2006). **Table 2.14** summarizes the number of dwellings within a 3 km (1.9 mi) radius of the proposed project site as determined by digital air photos, topographic information and land ownership maps.

Table 2.14: Dwellings Within a 3 km Radius from the Proposed Project Site

	Radius from Proposed Project Site		
	3 km (includes 2 km and 1 km)	**2 km (includes 1 km)**	**1 km**
Dwellings	803	16	7

The population within a 3 km (1.9 mi) radius of the proposed IWWTF site was estimated based on the number of dwellings (shown in **Table 2.14**) and the average number of persons per dwelling. The average number of persons per dwelling, calculated separately for the Town of Neepawa and the R.M.s of Langford, Rosedale and Lansdowne, was based on information regarding the total population and the total number of dwellings from Statistics Canada. For the Town of Neepawa, the calculation resulted in a value of 2.1 people/dwelling, while for the R.M.s of Langford, Rosedale and Lansdowne the calculation resulted in values of 2.7, 2.8 and 2.6 people/dwelling, respectively (Statistics Canada, 2007a, 2007b). The estimated surrounding population is shown in **Table 2.15**.

Table 2.15: Estimated Population, Businesses, Services, and Other Places of Gathering

	Radius from Proposed IWWTF Site		
	3 km (includes 2 km & 1 km)	**2 km (includes 1 km)**	**1 km**
Dwellings[1]	803	16	7
Estimated Contained Population (based on dwellings)[2]	1,702	39	17
Businesses[3]	54	0	0
Strip Malls[4]	1	0	0
Schools[4]	2	0	0
Day Cares / Nursery Schools / Senior Care Facilities[5]	6	0	0
Churches[5]	7	0	0
Medical Services[5]	5	0	0

Notes:

1. # of dwellings based on digital air photos (Manitoba Land Initiative, 1993a, 1993b, 1993c, 1993d), topographic information and land ownership maps (Rural Municipality of Langford, 2006; Rural Municipality of Lansdowne, 2006; Rural Municipality of Rosedale, 2006)
2. Average # of persons / dwelling = total population / total # of dwellings for R.M. or Town. Estimated contained population = (# of persons / dwelling as determined above)*(# of dwellings determined previously from air photos etc.)
3. Town of Neepawa Business Directory (Town of Neepawa, 2005b)
4. Town of Neepawa Community Profile (Manitoba Intergovernmental Affairs, 2000a)
5. Town of Neepawa Business Directory (Town of Neepawa, 2005b) and Town of Neepawa Community Profile (Manitoba Intergovernmental Affairs, 2000a)

To determine the approximate number of businesses within a 3 km (1.9 mi) radius of the proposed IWWTF site, the Town of Neepawa Business Directory was consulted to obtain a listing of businesses and their locations (Town of Neepawa, 2005b). A listing of the strip malls, schools, day cares, nursery schools, senior care facilities, churches, and medical services was compiled from the Town of Neepawa Business Directory and the Town of Neepawa Community Profile (Manitoba Intergovernmental Affairs, 2000a).

A summary of the estimated population, businesses, and other places of gathering within a 3 km (1.9 mi) radius of the proposed project site is provided in **Table 2.15.**

It was found that the majority of the dwellings, businesses, services, and other places of gathering were located between a 2 km (1.2 mi) and 3 km (1.9 mi) radius of the proposed IWWTF site. Further, there were no strip malls, schools, day cares, nursery schools, senior care facilities, churches, or medical services within a 1 km (0.6 mi) or 2 km (1.2 mi) radius of the proposed IWWTF site.

The services, facilities, and places of gathering found within a 3 km (1.9 mi) radius of the proposed IWWTF site are summarized in the following table (**Table 2.16**) according to the street/avenue on which they are located.

Table 2.16: Listing of All Schools, Day Cares / Nursery Schools / Senior Care Facilities, Churches, and Medical Services Within a 3 km Radius of the Proposed IWWTF Site

Location	Schools	Day Cares / Nursery Schools / Senior Care Facilities	Churches	Medical Services
1st Avenue	N/A	Elks Neepawa Manor	Knox Presbyterian Church St. Dominic's Roman Catholic Church St. James Anglican Church	Mountain Medical Clinic Neepawa & District Ambulance Service
Mountain Avenue	N/A	N/A	St. John's Ukrainian Catholic Church Neepawa United Church	Neepawa & District Medical Clinic
Davidson Street	Assiniboine Community College	Neepawa Nursery School Neepawa Co-op Play Centre Yellowhead Manor Kinsmen Courts	N/A	N/A
Hospital Street	Neepawa Area Collegiate	N/A	N/A	Neepawa Health Services
Hamilton Street	N/A	N/A	Calvary Chapel	N/A
Broadway Avenue	N/A	N/A	Christ Lutheran Church	N/A
Ellen Street	N/A	Eastview Lodge Personal Care Home	N/A	Dr. G.H.E. Ong Medical Corp.

Notes:

1. All names and locations obtained from Town of Neepawa Business Directory (Town of Neepawa, 2005b) and Town of Neepawa Community Profile (Manitoba Intergovernmental Affairs, 2000a).
2. N/A = Not Applicable: no schools, day cares / nursery schools / senior care facilities, churches, or medical services on the specified street/avenue within the given radii.

It was found that 1st Avenue, Mountain Avenue, and Davidson Street in the Town of Neepawa contain most of the schools, day cares, nursery schools, senior care facilities, churches, or medical services within a 3 km (1.9 mi) radius of the proposed IWWTF site.

Section 3.0
Plant Site Description

SECTION 3.0
PLANT SITE DESCRIPTION

3.1 SITE LAYOUT

The proposed IWWTF will include a screening/pumping building, a flow attenuation tank, an anoxic tank, two aeration tanks, two post anoxic tanks and a treatment building. The proposed IWWTF will also include the relining and installation of a divider berm, aeration piping and mixing equipment in existing aerobic cell #3 of the existing IWWTF to provide sludge storage capacity. The flow attenuation, anoxic, aeration and post-anoxic tanks will consist of insulated aboveground steel tanks. The screening/pumping building and the treatment buildings will be pre-engineered steel slab-on-grade buildings, measuring approximately 420 m^2 (4521 ft^2) and 513 m^2 (5522 ft^2) in size, respectively. The proposed buildings and tanks will be located to the west of the existing IWWTF as shown in **Figure 3.1** on a parcel of land currently owned by Springhill Farms Inc. which is to be purchased by the Town of Neepawa.

A new gravel site access road will be developed and will enter the site from the west using the existing right of way as shown in **Figure 3.1**. A gravel road will also be constructed from the new site access road to the north of existing aeration cell #3 and will include a truck turn-around. In an effort to reduce dirt traffic into buildings, 10 m (33 ft) of asphalt will be installed as an approach on all garage doors, sidewalks and personnel doors at the proposed buildings.

Natural gas will be used for building and process heat. A natural gas pipeline will enter the site from the south-east.

A new power service will be brought into the site from the existing power lines running in an east-west direction adjacent to Provincial Highway 16 to the south of the proposed IWWTF site.

Potable water will be supplied to the site from the existing potable water loop supplied to the Springhill Farms pork processing facility and will enter the site from the south-east.

3.2 EXISTING ON-SITE FACILITIES

Construction of the existing IWWTF began in June 1986 and was completed in the spring of 1987 (UMA, 2001). The existing IWWTF is operated by the Town of Neepawa under the Clean Environment Commission (CEC) order No. 1103VC issued July 20, 1986 and amended July 2, 1987. For discharge to the Whitemud River, the treated effluent has to satisfy the discharge limits specified in the CEC order No. 1103VC (summarized in **Table 3.1**).

Table 3.1: CEC Order No. 1103VC Effluent Limits

Parameter	Units	CEC Effluent Limits	
		Summer (May 1 to Oct 31)	**Winter (Nov 1 – Apr 30)**
BOD_5	mg/L	30	30
TSS	mg/L	30	30
NH_4-N	kg/d	3	10
(NO_2+NO_3)-N	kg/d	30	90
Total Chlorine	mg/L	0.1	0.1
Fecal Coliform	MPN/100 mL	200	200
Salmonella Bacteria	Presence	0	0

The existing IWWTF was designed to treat the wastewater produced by the Springhill Farms pork processing facility operating on a single-shift slaughter of up to 4,000 hogs per day and a design average flow rate of 1,520 m^3/day. Springhill Farms discharges wastewater to the IWWTF consisting of the following components: supernatant from the underground manure storage tank in the hog receiving facility, processing wastewater, truck wash wastewater and sanitary wastewater.

Pre-treatment of the wastewater includes the following components

- Screening and dissolved air flotation (DAF) – operated by Springhill Farms
- Lift station and forcemain

The existing IWWTF includes the following components:

- Anaerobic cell
- Anoxic cell
- Aerobic cells #1, #2 and #3
- Chlorination and de-chlorination unit including rock filter
- Effluent outfall near the Whitemud River

The conceptual layout of the existing IWWTF is shown in **Figure 3.2.**

The dimensions and storage volumes of the existing treatment cells are shown in **Table 3.2**.

Table 3.2: Existing IWWTF Basin Dimensions

Cell	Length (m)	Width (m)	Side Slope (H:V)	Depth (m)		Volume (m^3)	
				HLL	LLL	HLL	LLL
Anaerobic	24	24	3:1	5.0	4.4	7,980	6,345
Anoxic	9.6	9.6	vertical	5.3	5.0	485	455
Aerobic #1	16.9	16.0	3:1	5.0	4.7	5,320	4,695
Aerobic #2	16.9	16.0	3:1	5.0	4.7	5,320	4,695
Aerobic #3	114.0	58.0	4:1	5.0	3.0	52,925	26,605

Notes:

1. HLL = High Liquid Level
2. LLL = Low Liquid Level
3. Dimensional data is from UMA report (UMA, 2001).

3.2.1 Influent to IWWTF

The processing wastewater is presently pre-treated with screens and a dissolved air flotation (DAF) unit at the Springhill Farms pork processing facility and is conveyed by a raw sewage lift station and forcemain for further treatment at the IWWTF. The lift station also conveys sanitary wastewater, truck wash wastewater and supernatant from the underground manure storage tank to the existing IWWTF for treatment.

3.2.2 Anaerobic Cell

The anaerobic cell is used for settling suspended solids and degradation of the influent organic matter. The anaerobic cell can be classified as a low rate reactor.

The forcemain and lift station transfer the pre-treated wastewater to the anaerobic cell at the IWWTF. At the south toe of the existing anaerobic cell, there is a tee connection which enables the influent flow to bypass the anaerobic cell and flow directly to the anoxic cell or aerobic cell #1. The effluent from the anaerobic cell is discharged to the anoxic cell. The existing anaerobic cell is not covered and undergoes significant temperature fluctuation throughout the year.

3.2.3 Anoxic Cell

The anoxic cell receives inflow from the anaerobic cell and has been designed to optionally allow the transfer of waste sludge back to the anaerobic cell, however this option is currently not in use. Sludge has not been wasted from the anoxic cell to the anaerobic cell since the start up of the plant reportedly possibly due to low mixed liquor suspended solids concentrations in the aerated cells (UMA, 2001). The anoxic cell also receives recycled flow from aerobic cell #1 and #2 at an approximate rate of 10 times the flow from the anaerobic cell. The anoxic cell was to provide an environment devoid of free oxygen to facilitate the denitrification process (conversion of nitrate into nitrogen gas). The anoxic cell is currently uncovered and undergoes temperature variations throughout the year.

3.2.4 Aerobic Cells

Liquid from the anoxic cell is discharged to aerobic cell #1 with the potential to also discharge to aerobic cell #2, however the aerobic cells are typically operated in series. The purpose of the aerobic cells is to further breakdown organic matter, convert ammonia to nitrate and separate suspended solids from the effluent. The effluent from aerobic cell #2 is discharged to aerobic cell #3 where further polishing and stabilizing occurs prior to discharge to the chlorination and de-chlorination units. The aerobic cells are currently aerated with a coarse bubble system.

3.2.5 Chlorination Unit

Effluent is discharged from aerobic cell #3 to the chlorination unit. The water is disinfected using chlorine prior to flowing to a rock filter (where dechlorination occurs and additional solids are removed). From the rock filter, effluent flows to the effluent cell in the chlorination building and subsequently flows to the effluent pipeline for discharge to the Whitemud River.

The chlorination unit and rock filter have not been operated for approximately 10 years. Currently effluent is not chlorinated and flows are directed through the chlorination building directly to the effluent chamber (by-passing the rock filter) and subsequently to the effluent pipeline.

3.2.6 Effluent Pipeline

The IWWTF was designed to discharge to the Whitemud River via a gravity flow effluent pipeline. The effluent pipeline discharges to a low lying area prior to flowing into the Whitemud River. Currently the effluent produced by the IWWTF is discharged to the Town of Neepawa municipal cell #3 using a temporary transfer pipe.

3.2.7 Temporary Transfer Pipe

The IWWTF is currently allowed to operate with the use of an overland temporary transfer pipeline from the effluent pipeline to the Town of Neepawa municipal cell #3. The temporary pipeline consists of a 15.2 cm (6 in) diameter high density polyethylene pipe. This line is surface lying and crosses the Whitemud River via a golf course bridge. Flow is transferred from the IWWTF outfall to the municipal cell #3 by gravity. The existing outfall location and the temporary transfer pipe are shown in **Figures 3.3 to 3.5.**

3.3 PROPOSED ON-SITE FACILITIES

Collected manure from the underground manure storage tank and process, sanitary, and truck wash wastewater generated at the Springhill Farms pork processing facility will be treated at the new IWWTF site. Process wastewater generated at the Springhill Farms facility will be screened at the facility prior to transfer to the IWWTF. Screenings removed from the process wastewater will be disposed of at a rendering facility. At the IWWTF, all wastewater streams will be screened and transferred to the first stage of a two stage dissolved air flotation (DAF) system. Fat will be removed from the sludge generated in the first stage DAF unit using a tricanter process. The removed fat will be stored in a heated vessel and will be used as a fuel (complimentary to natural gas) for the tricanter's boiler process. Liquid effluent from the first stage DAF unit will be pumped to a flow attenuation tank which will be used to equalize flow for the rest of the IWWTF processes. From the flow attenuation tank, wastewater will be sent to the second stage of the two stage DAF system. The wastewater will be further treated via an activated sludge process including membrane bioreactors, ultraviolet light (UV) disinfection and a cooling and aeration process prior to discharge to the Whitemud River via the existing effluent outfall.

A portion of the UV disinfected membrane permeate will be chlorinated and re-used as non-potable utility water. The existing anoxic tank may be re-used to provide storage for the chlorinated non-potable utility water.

Screenings removed during the initial treatment stage will be transferred to a bin and removed on a regular basis for disposal at a permitted landfill. Biosolids will be stored in aeration cell #3 which will be retrofitted to produce two re-lined sludge storage cells equipped with aeration piping and mixing equipment. The sludge cells will be operated in a batch process with "fill" and "isolation" periods of approximately one year. After approximately one year of full isolation, stabilized biosolids will be applied to agricultural land in accordance with Environment Act Licence requirements.

Domestic solid waste generated at the proposed IWWTF will be disposed of in an offsite permitted landfill.

The buildings and structural components of the proposed IWWTF will have a life expectancy of approximately 30 to 50 years. The aboveground steel tanks have a minimum life expectancy of approximately 20 years. The mechanical equipment's life expectancy is approximately 15 years whereas the membrane life expectancy is approximately 8 to 10 years. Mechanical equipment and membranes will be replaced as required and combined with ongoing regular maintenance during IWWTF operation to extend the life of the facility as long as necessary.

3.4 DECOMMISSIONING OF EXISTING FACILITIES

The existing aeration cell #3 will be re-used and will be retrofitted for sludge stabilization and storage. The remaining existing anaerobic and aeration cells #1 and #2 will not be used immediately in the new system. Each of these cells will be maintained with a water cap for at least one year to ensure stabilization. After that hold time, the ponds will be dewatered and the sludge will be removed and applied to land. The decant from the cells will be slowly pumped to the IWWTF for treatment. The berms will be left in-place.

The existing chlorination building will remain on-site, however the equipment within the building will be decommissioned and removed. The existing rock filter area will be retrofitted for effluent cooling. The existing temporary effluent transfer hose connecting the Town of Neepawa municipal cell #3 and the existing IWWTF will be flushed, disconnected and removed. Any buried pipelines that will be abandoned, will be flushed, capped and abandoned in place.

The existing DAF unit at Springhill Farms will be decommissioned once the proposed IWWTF is in operation.

The existing anoxic tank will remain on site for potential use for storage of chlorinated non-potable utility water.

3.5 OVERVIEW OF CONSTRUCTION

Construction of the proposed Town of Neepawa IWWTF will begin in September 2008 and will continue to August 2009. Start-up, commissioning and performance testing will occur between August 2009 and February 2010. During October and November 2008, typically a construction crew of 10 people will be on-site. From April through to September 2009, a construction crew of approximately 20 people will be on-site. An approximate project schedule is included in **Table 3.3**.

Table 3.3: Preliminary Project Schedule for Proposed IWWTF

Element	Start	Finish
Treatment building subgrade with stubs for process piping, water, electrical	September 2008	October 2008
Treatment building foundation	October 2008	November 2008
Metal building erection	December 2008	March 2009
Furnish electrical/lab/breakroom	March 2009	April 2009
Site grading and civil piping	April 2009	May 2009
Tank foundations	May 2009	June 2009
Tank erection	June 2009	July 2009
Tank testing	July 2009	August 2009
Process mechanical in buildings	April 2009	June 2009
Electrical	May 2009	July 2009
Instrumentation – integration	July 2009	August 2009
Asphalt	August 2009	September 2009
Seeding/landscaping	September 2009	September 2009

Construction material will be brought to the site by truck. The membrane bioreactor equipment will come from Ontario whereas other specialized equipment may be supplied from various locations throughout North America and possibly Europe.

Construction contracts will be awarded through invited and voluntarily submitted tenders. It is anticipated that most bidders will be based in Manitoba or other nearby provinces with the exception of specialized equipment. The successful bidder will, in general, be selected on the basis of quality of workmanship, track record on similar projects and price from among the qualified bidders. The skills required of construction workers will be typical of any facility containing considerable processing equipment including: carpenters, welders, pipe fitters, electricians, sheet metal workers, plumbers, and labourers. It is anticipated the majority of these workers will be from areas of Southern Manitoba.

Section 4.0
Process Description

SECTION 4.0
PROCESS DESCRIPTION

4.1 GENERAL PROCESS DESCRIPTION

The proposed IWWTF will be located on approximately 2.3 ha (5.6 acre) of land within a portion of Lot 1, Plan 23208 BLTO exc. Plan 23208 NLTO, as is described in **Appendix A** and shown in **Figure 1.1**. The proposed IWWTF has been designed to treat an equalized flow of 1,520 m^3/day of wastewater and will discharge treated effluent to the Whitemud River on a continuous basis. The design basis of the proposed facility is described in **Section 4.2**.

Wastewater will receive initial treatment via a screen and a two stage dissolved air flotation (DAF) system in conjunction with flow attenuation. The treated wastewater will then undergo further treatment using activated sludge bioreactors, membranes and ultraviolet (UV) disinfection. The final treated effluent will be cooled and aerated prior to discharge to a low lying area near the Whitemud River via the existing effluent outfall pipeline.

Sludge produced by the treatment processes will be transferred to an existing cell. The cell will be divided into two halves, be re-lined and be retrofitted with aeration piping and mixing equipment. The retrofitted cell will be used for biosolids stabilization and isolation prior to land application. Fat will be removed from the first stage DAF sludge using a tricanter process. Once removed, the fat will be stored in a heated vessel and used to augment the natural gas fuel that is used by the tricanter's boiler.

The information included in the following sections is taken largely from the proposed IWWTF functional design report included in **Appendix I**. A detailed description of the inputs and outputs of the facility are included in **Section 5.0**. The proposed site layout is shown in **Figure 3.1** and building layout plans are included in **Figures 4.1 to 4.4**.

4.2 DESIGN BASIS

The proposed IWWTF has been designed to treat the wastewater produced by the Springhill Farms pork processing facility based on a maximum pork processing capacity of 27,550 hogs killed and cut on a weekly basis. The pork processing facility will typically operate for five or six days in a seven day period. The anticipated wastewater production from the hog processing plant and ancillary processes will be approximately 2,128 m^3/day on a production day, while the average weekly equalized flow will be 1,520 m^3/day. The flow is proposed to be balanced over a seven day period as detailed in subsequent sections. The estimated raw influent wastewater characteristics are included in **Section 5.1.2.**

4.3 DETAILED PROCESS DESCRIPTION

A process flow diagram for the proposed IWWTF is shown in **Figure 4.5**.

4.3.1 Wastewater Initial Treatment

Springhill Farms generates wastewater from processing operations, sanitary services, the hog receiving facility, and the on-site truck wash. Wastewater flows from the hog receiving facility holding pens through a slotted floor where it is scraped to a holding tank. Manure from the holding tank will be directed to the IWWTF for treatment.

The wastewater from the on-site truck wash passes through a rotary screen and an oil and sand interceptor prior to being discharged to the IWWTF.

Currently process wastewater is screened and drained to a sump in the DAF treatment room at Springhill Farms. This wastewater is pumped to the existing DAF to facilitate solids removal and the DAF effluent then flows to a common manhole which also receives the sanitary wastewater, the hog receiving facility wastewater and the truck wash wastewater. The combined flows are then pumped to the existing IWWTF.

It is proposed that the process wastewater be screened and transferred directly (bypassing the existing DAF sump) to the existing manhole to be combined with the sanitary wastewater, the hog receiving facility wastewater and the truck wash wastewater. The combined wastewater will flow by gravity from the manhole to a new raw influent pump station that will convey flow to the screening/pumping building via a forcemain. There will be one duty and one standby pump providing influent pumping.

The screening/pumping building will be approximately 420 m^2 (4,521 ft^2) in area. Once at the screening/pumping building, wastewater will be screened to remove solids. A new internally fed drum wedgewire screen will be installed with a screen size of 0.76 to 1.0 mm (0.0299 to 0.0394 in). In the event of a screen breakdown, where the screen could no longer function, the system can be run without screening. Solids removed during screening will be transferred to a bin which will be removed and replaced on a regular basis, with solids being disposed of at an approved landfill. Sanitary wastewater generated at the proposed new IWWTF in the employee rest rooms, break rooms and laboratory as well as drain water from the screening/pumping and treatment buildings will be pumped to the influent screen to undergo treatment. Drain water will consist of water directed to floor drains during building cleaning as well as the liquid stream generated during the thickening of waste activated sludge. Screened effluent will flow by gravity to the first DAF of the two stage DAF system.

The raw influent pumping and screening facilities will be sized to process all wastewater flows that are generated during the production schedule as flow can vary widely during the production day. The raw influent pumping and screening facilities are sized for up to 6,538 m^3/day. On a seven day period, this equates to a peaking factor of 4.3 whereas if this flow is applied to a five day period (typical production period), the associated peaking factor is 3.0. It is common practice to design screening for a peak to prevent plugging and to accommodate flow variation.

From the screening facilities, flow will be directed by gravity to the first DAF of a new two stage DAF system, to be located in the screening/pumping building. The first stage will not include chemical addition and will remove 70 to 80% of the fat present in the incoming waste stream. Float sludge from the first DAF will drain to a dedicated hopper and then treated in a tricanter process to fractionate the fat from the sludge. The fat and sludge will be handled as described in **Section 4.3.7**. The liquid stream from the first stage DAF will drain to a sump and will be pumped to a new flow attenuation tank. The first stage DAF will be sized to treat unequalized flows from the raw influent pump system.

The attenuation tank will be an aboveground covered and insulated steel tank measuring approximately 24.4 m (80.1 ft) in diameter and 9.1 m (29.9 ft) in height. The capacity of the attenuation tank will be 3,787 m^3 or approximately 2.5 days of storage. The attenuation tank will be equipped with a mixing system to prevent solids from settling. Normally, the attenuation tank will fill throughout the week and will drain to the treatment plant over the two day weekend to keep the flow rate relatively constant. The remaining 0.5 days of storage will be used as a minimum water level to ensure that the tank can be mixed and that the wastewater quality out of the tank remains consistent.

Effluent is pumped to the second unit of the two stage DAF system located in the screening/pumping building, from the flow attenuation tank. The second stage DAF will include dosing of metal salt and polymer to coagulate the blood and flocculate solids for higher removal percentages. Metal salt (such as ferric chloride or alum) and polymer is dosed to the effluent of the attenuation tank prior to entering the DAF unit. Metal salt and polymer tankage will also be located in the screening/pumping building. The effluent from the second stage DAF unit will be dosed with magnesium hydroxide to adjust the pH then will be pumped to a standpipe/wetwell prior to being pumped to a new anoxic tank. The magnesium hydroxide tankage will be located in the screening/pumping building. There will be one duty and one standby DAF effluent pump. The handling of biosolids removed during the initial treatment is detailed in **Section 4.3.7**. In the event of servicing, the system is sized as such so it can run with one DAF unit down if necessary.

4.3.2 Activated Sludge and Membrane Bioreactor Treatment Process

The activated sludge process relies on the growth of suspended bacteria in a controlled manner, consuming organic material from the wastewater. They convert the organic material, expressed as chemical oxygen demand (COD) or biochemical oxygen demand (BOD) and produce more bacteria biomass. In doing so, nitrogen and phosphorus are taken out of solution to support growth of the bacteria. The bacteria grow while consuming the wastewater, and are wasted on a continuous basis to keep their concentration constant.

From the second stage DAF unit, the effluent will be delivered via pump to a new anoxic tank. Within the anoxic tank, denitrification occurs where nitrate is transformed back to nitrogen gas (N_2) and is released to the atmosphere. Metal salt will be added to the tank to further reduce the soluble phosphorus concentration in the liquid stream. The anoxic tank will be an aboveground insulated steel tank measuring approximately 14.3 m (46.9 ft) in diameter and 6.4 m (21.0 ft) in height and the contents will be mixed using a floating mixer.

From the anoxic tank, wastewater flows will be split evenly with each stream being pumped to one of two aeration tanks where the wastewater will be aerated using membrane diffusers. Within the aeration tanks, nitrification occurs where ammonia is converted to nitrate. The aeration tanks will be aboveground insulated steel tanks measuring approximately 12.5 m (41.0 ft) in diameter and 6.4 m (21.0 ft) in height. Nitrified mixed liquor (activated sludge bacteria) will be returned via pump from the aeration tanks at a rate of approximately 12-14 times the average flow rate to the anoxic tank to fuel the denitrification process. The anoxic recycle pumping will be accomplished using air lift pumps. One blower (the same size as the aeration blowers) will be dedicated to air lift pumping and a standby blower will be provided for backup.

From each aeration tank, flow will be directed to a post anoxic tank. An external carbon source (sugar) will be added to the post anoxic tank as necessary to remove additional nitrate from solution. The sugar stock tankage will be located within the treatment building that will be approximately 513 m^2 (5,522 ft^2) in area. The two post anoxic tanks will be covered aboveground insulated steel tanks measuring approximately 6 m (19.7 ft) in diameter and 6 m (19.7 ft) in height and will be located outside of the treatment building.

Chemical feed systems for sugar, metal salt, magnesium hydroxide and polymer will all use the same model of delivery pumps (variable speed peristaltic). An uninstalled shelf spare pump will be provided as a replacement in the event of a pump malfunction.

Secondary containment will be provided for metal salt and polymer tankage equal to a volume of 1.1 times the maximum storage volume. No secondary containment will be provided for sugar or magnesium hydroxide tankage as these chemicals are considered non-aggressive.

From the post anoxic tank, flow will be directed to the membrane bioreactors within the treatment building where solids separation takes place. Each membrane unit will consist of a rectangular tank with membrane elements in two cassettes immersed in the tank. The membrane units are designed so that during periods of maintenance, design flows can be accommodated in one membrane tank. Membranes will be cleaned periodically with citric acid and sodium hypochlorite. Sodium hypochlorite will be stored in totes and the storage area will be equipped with secondary containment. Citric acid will be stored in drums. Permeate from the membranes will be combined in a common header and will be pumped to UV disinfection, whereas the mixed liquor (concentrated activated sludge bacteria) will be returned to the aeration tank. A portion of the returned mixed liquor will be wasted and handled as detailed in **Section 4.3.7**.

4.3.3 Effluent Disinfection

Permeate from the membranes will have very low suspended solids and turbidity and, as a result, is relatively easy to disinfect. A closed conduit ultraviolet disinfection system is proposed for use within the treatment building. The unit will be a low pressure high intensity system and will consist of two units providing a design dosage of 100 mJ/cm^2. Each unit has been designed to disinfect up to 120% of the design flow and will operate with one unit as duty and the second unit as standby.

4.3.4 Non Potable Water – Utility Water

A small amount of disinfected permeate will be used as non-potable utility water. This water will be chlorinated using sodium hypochlorite and a small chlorination system located in the treatment building. Chlorinated permeate will be used for internal plant processes such as dilution water for chemical dosing systems and screen washing. Some water will be re-used in the on-site truck wash at the Springhill Farms facility. The existing IWWTF anoxic tank may be re-used to provide storage for the chlorinated non-potable utility water.

4.3.5 Effluent Cooling

From UV disinfection, treated wastewater will flow to a cooling process. The process will included a cascade type system and will provide aeration and effluent at ambient conditions (4ºC in winter months). The process will include optional recirculation and automatic bypass to regulate the effluent temperature. The automatic diversion valve will be linked to a temperature transmitter and be designed so that if the wastewater begins to freeze, the cooling system would be bypassed to avoid freezing in the effluent pipeline. Spare recycle pumps will be provided as backup replacement parts. It is anticipated that the effluent cooling process will be located in the area of the existing rock filter.

4.3.6 Effluent Outfall

From the cooling process, treated effluent will flow by gravity through the existing effluent outfall with eventual discharge to the low lying area near the Whitemud River. Riprap will be placed at the end of the effluent outfall to prevent erosive impacts due to wastewater discharges. Some additional aeration will be provided by discharging the effluent onto the riprap.

4.3.7 Biosolids Handling

Three sludge streams will be generated at the proposed IWWTF and will consist of:

- Sludge produced in the first stage DAF of the initial treatment process
- Sludge produced in the second stage DAF of the initial treatment process
- Waste Activated Sludge (WAS) produced in the membrane bioreactor process

The sludge produced in the first stage of the DAF system will be pumped to a tricanter process where fat will be separated from the sludge. The sludge will be heated in the tricanter prior to dewatering via a centrifuge (located in the screening/pumping building). The centrifuge will fractionate the fat from the solids and water. Fat will be pumped to a heated storage vessel located in the screening/pumping building for use in the tricanter process boiler system as fuel. The separated sludge will be transferred to a common hopper located in the screening/pumping building. The fat from the first DAF unit is expected to fully fuel the boiler on an average basis. The boiler will also be equipped with dual natural gas burners as a backup system.

Sludge produced in the second DAF unit will also be transferred to the common hopper.

A portion of the activated sludge produced by the membrane bioreactor will be wasted (WAS – waste activated sludge) and will be transferred to a dissolved air flotation thickener (DAFT) located in the screening/pumping building to increase the solids content of the sludge. The liquid stream from the DAFT unit will be returned to the screen at the front of the treatment process for processing whereas the biosolids will be sent to the common hopper.

From the common hopper, sludge from the three streams will be transferred to the retrofitted aeration cell #3 for stabilization and isolation. Prior to construction in the cell, the liquid contents of the cell will be drained with the effluent directed to the Town of Neepawa municipal cell #3. Sludge that may have accumulated in the cell will be removed and will be land applied. A new divider berm will be installed in the middle of the cell and the slopes of the cell will be re-graded from the existing 4:1 (H:V) slope to a 3:1 slope to provide additional storage volume in the cell. The material spoils from the re-grading will be used to construct the divider berm which will minimize the amount of borrow material required at the site. A new double layer high density polyethylene (HDPE) liner system will be installed to provide primary and secondary containment.

The liner system will consist of HDPE geocomposite media with single sided non-woven geotextile on the soil side for gas venting, 2.032 mm (80 mil) HDPE conductive containment liner plumbed to a monitoring sump, HDPE geocomposite media to convey seepage flow between the liners and a final primary layer of 2.032 mm (80 mil) HDPE conductive liner. The conductive liner allows for an additional quality control check during the installation process to ensure there are no leaks. During operation, potential liner leaks will be identified by monitoring the sump connected to the liners.

The new sludge cells will have aeration systems, mixing and sludge loadout. Each sludge cell will have an approximate capacity of 18,500 m^3 and will be able to provide approximately 400 days of sludge holding time. The cells will be operated in a batch process with “fill” and “isolation” periods lasting at least one year each. The sludge cells will be aerated during the fill period however will not be aerated during their isolation period. After an isolation period of approximately one year, biosolids will be applied to agricultural land.

4.3.8 Backup Power

A small engine generator will be provided to supply power in the event of a power failure. The generator will utilize diesel fuel and will be tested on a periodic basis for maintenance purposes. The generator will be sized to provide power to the flow conveyance equipment (pumps including recycle pumps), initial treatment DAF units, the membrane system (pumps, membrane blowers, compressors, etc), chemical dosing equipment, UV disinfection equipment, the effluent cooling device and the central programmable logic controller. The central programmable logic controller will also be equipped with a battery unit capable of supplying power during the generator start-up period.

4.3.9 Facility Hydraulic Profile

The majority of flow throughout the proposed IWWTF will be pumped. Gravity flows occur from the fine screen to the first stage DAF, from the aerobic tank to the post anoxic tank, from the post anoxic tank to the membrane bioreactors and from the cooling process through the final effluent pipeline. A plant hydraulic profile is shown in **Figure 4.6**.

4.4 STAFFING

The IWWTF will operate on a 24 hour per day 7 day per week basis. The IWWTF will be staffed during one shift per day, seven days per week. Likely three full time staff members will be required to operate the facility.

4.5 FUTURE EXPANSION

The IWWTF layout has been designed for future growth options. However, at this time Springhill Farms has no intention of expanding beyond the licenced capacity of their processing facility and the IWWTF processes have been designed to match that capacity.

Section 5.0
Inputs/Outputs

SECTION 5.0
INPUTS/OUTPUTS

The following sections describe the inputs and the outputs of the proposed Town of Neepawa IWWTF.

5.1 CONSTRUCTION INPUTS

During the construction phase of the project, inputs will include all materials required to construct the IWWTF such as; pumps, pipes, screens, mixers, steel tanks, pre-engineered steel buildings, chemical dosing systems, membrane units, chemical feed tanks and liners, concrete, gravel, fill, fuel and other materials. Further, raw materials such as gravel, fill and asphalt will be required for site works.

5.2 OPERATION INPUTS

5.2.1 Influent Wastewater

Wastewater generated at the Springhill Farms pork processing facility will be treated at the Town of Neepawa IWWTF. Wastewater is generated at Springhill Farms from processing operations, sanitary use, the hog receiving facility and the on-site truck wash.

Raw wastewater will be screened and sent to the first stage of a two stage dissolved air flotation (DAF) system. Wastewater will then be sent to a flow attenuation tank to equalize the flows to the remainder of the treatment train including the second stage DAF.

The following table presents the anticipated raw wastewater characteristics from the Springhill Farms facility operating at full licenced capacity, including process wastewater, sanitary wastewater, truck wash wastewater and hog receiving facility wastewater.

Table 5.1: Anticipated Raw Wastewater Characteristics Generated by Springhill Farms Operating at Full Licensed Capacity

	Units	Raw Influent to Initial Treatment
Total Weekly Flow	m^3/week	10,640
Equalized Flow	m^3/day	1,520
5-day Biochemical Oxygen Demand (BOD_5)	mg/L	1,440
Chemical Oxygen Demand (COD)	mg/L	3,315
Total Suspended Solids (TSS)	mg/L	850
Total Kjeldahl Nitrogen (TKN)	mg/L	338
Total Phosphorus (TP)	mg/L	30
Temperature	ºC	25-30

The treatment facility will be designed to treat the weekly production flow, with typically five to six days of operation in a 7-day period. The equalization tank will typically fill during the week and will drain over the course of the weekend, allowing the equalization of flow to the remainder of the treatment train to be reduced to 1,520 m^3/day.

Influent flow and quality will be monitored at the wet well prior to the fine screen at the front of the initial treatment train.

5.2.2 Fuels

Natural gas will be used for building and process heat. The treatment building and the screening/pumping building will be insulated and heated to around 12ºC (53.6 ºF) in winter conditions. The break rooms and electrical rooms will be kept at 20ºC (68 ºF).

The sludge stream from the first stage DAF unit will be heat treated to facilitate fractionation of the fat in a tricanter process. The fat from the DAF unit is expected to fully meet the fuel requirements of the fat fractionation boiler on an average basis. The boiler will also be equipped with dual natural gas burners as a backup system.

It is estimated that the entire IWWTF will use approximately 77,000 m^3 (2,719,229 ft^3) of natural gas per year.

Diesel fuel will be used at the IWWTF to fuel the backup generator. It is estimated that less than 38 L per month will be required for generator testing/maintenance. Generator refuelling will occur on a concrete pad with spill kits available. The fuel for the generator will be stored in the generator's integral tank. There will be no bulk aboveground or underground diesel storage tanks at the site.

5.2.3 Chemicals

Chemicals used at the proposed IWWTF will be stored in the treatment and the screening/pumping buildings at the IWWTF. Within the screening/pumping building, metal salt (such as ferric chloride or alum) and polymer will be stored in areas with secondary containment. Within the treatment building, sodium hypochlorite will be stored in a designated area with secondary containment. Within the secondary containment areas, there will not be any floor drains.

Magnesium hydroxide will be stored in the screening/pumping building but will not have secondary containment as this chemical is considered non-aggressive. Sugar and citric acid will be stored in the treatment building; however these storage areas will not have any secondary containment. In the event of spills in the citric acid, magnesium hydroxide or sugar storage areas, a floor drain in the area will direct the spill to the screens near the front of the wastewater treatment train.

The design of the chemical storage areas will adhere to the requirements of the National Fire Protection Association Standard 820: Standard for Fire Protection in Wastewater Treatment and Collection Facilities and the Manitoba Fire Code.

A list of chemicals anticipated to be used in the proposed facility is included in **Table 5.2**.

Table 5.2: Chemicals to be Used at the Proposed Town of Neepawa IWWTF

Chemical	Description	Estimated Usage	Storage Size	Dangerous Good
Citric acid	Membrane bioreactor clean in place chemicals	1,670 litres per year	208 L drum (typically made of polyethylene)	No
Ferric Chloride or other metal salt	Dosing chemical for wastewater treatment	950 litres per day	23 m^3 polyethylene tank with secondary containment	Yes
Magnesium Hydroxide	Alkalinity for wastewater treatment	1,050 litres per day	23 m^3 painted steel tank	No
Polymer	Flocculant for wastewater treatment	20-30 litres per day	920 L polyethylene totes with secondary containment	No
Sodium hypochlorite	Membrane bioreactor clean in place chemicals	2,600 litres per year	920 L polyethylene totes with secondary containment	Yes
Sugar (or similar carbon source)	Carbon source for wastewater treatment	130 kg per day	23 m^3 polyethylene tank	No

A regular inventory will be maintained to keep track of the chemicals used. For specific chemical information related to the identified dangerous goods, typical material safety data sheets (MSDS) can be found in **Appendix J**.

Sugar will be purchased in dry form and will be dissolved in batches. Citric acid will be handled as powder and made up in batches. Dilution water for citric acid and sugar will be potable water supplied to the site. Dilution water for polymer and magnesium hydroxide will be supplied from the membrane permeate that will be UV disinfected and chlorinated using a small chlorination system located in the treatment building.

Chemical storage areas will be cleaned by sweeping and rinsing to floor drains that subsequently flow to the screens near the front of the treatment train.

Small quantities of general cleaning chemicals such as detergents and bleach will be used and stored in the proposed buildings. Cleaning chemicals will be stored in designated areas.

5.2.4 Electricity

Electrical service will be brought to the site from existing power lines that run along Provincial Highway 16, to the south of the proposed IWWTF site. The proposed IWWTF is expected to require approximately 900 kW of connected power and 450 kW of typical demand power.

5.2.5 Water

Potable water will be supplied to the IWWTF site for use in the employee rest room, break room and laboratory areas in the treatment building. Potable water will be used for some cleaning and possibly used to dissolve sugar for chemical dosing to the post anoxic tanks.

Potable water will be supplied to the site via the 5 cm (2 inch) potable water supply loop that supplies the Springhill Farms processing facility. It is estimated that less than 1,500 litres per day of potable water will be required at the IWWTF site.

Permeate from the membrane bioreactors will be used as screen wash water, wash down water, chemical dilution water and truck wash water to reduce potable water consumption of the proposed IWWTF and at the Springhill Farms truck wash. It is estimated that up to 190 m^3 of treated effluent will be reused on a daily basis in this fashion.

5.2.6 Traffic

Incoming traffic to the site will include employee traffic, chemical delivery traffic, screenings disposal traffic and biosolids land application traffic. Employee traffic will likely be generated by three employees per day, seven days per week, but may vary depending on employee holiday schedules etc. Chemical delivery traffic will include deliveries of citric acid, metal salt, magnesium hydroxide, polymer, sodium hypochlorite and sugar (or similar carbon source). Screenings will be transported off-site on a regular basis. Between chemical delivery traffic and screenings disposal traffic, approximately two trucks per week will travel to the IWWTF.

After approximately one year of full isolation, biosolids will be applied to agricultural land. During the application period, trucks will be used to transport the biosolids from the sludge cells to the various suitable application sites. It is estimated that approximately 500 truck loads (36 m^3 or 8,000 IMP gallons per truck) over a one to two week period will be required. There will be approximately 57 truck loads per day arriving/leaving the proposed IWWTF site during the application period.

5.3 CONSTRUCTION OUTPUTS

5.3.1 Emissions to the Atmosphere

During construction, there will be emissions to the atmosphere typical of a large scale construction project such as those related to construction vehicle and heavy equipment exhaust emissions. Dust emissions may be generated during travel, excavation and grading work and the retro-fitting of the aeration cell for sludge storage. Odours and air emissions may be generated during paving, roofing, and while adhesives and waterproofing chemicals are used.

Odours may also be generated during the removal of sludge that may have accumulated in aeration cell #3 during the retrofitting process and during the decommissioning process at the anaerobic and aeration cells #1 and #2.

Noise will be generated on-site due to vehicles and heavy equipment use. As building foundations will be slab on grade, piling is not anticipated to be required.

5.3.2 Surface Runoff Discharges

Surface runoff during construction will be typical of a large construction site. There is potential for surface runoff to be contaminated from accidental fuel and chemical spills and construction debris. Fuel and chemical storage areas will be equipped with containment to ensure that if spills occur, contact with surface runoff water is minimized. Construction debris will be kept to a minimum through implementation of good housekeeping measures to ensure that surface runoff quality is not affected. Surface runoff could also potentially be affected by sediment loads. Where possible, silt fences will be used to minimize the amount of sediment contained in the surface runoff discharges.

5.3.3 Outputs From the Construction of the Sludge Storage Cell

Liquid in the existing IWWTF aeration cell #3 will be transferred to the Town of Neepawa municipal cell #3 prior to any construction in aeration cell #3. Any sludge that may have accumulated in this cell will be removed and applied to agricultural land in accordance with an accepted land application program to be developed in consultation with Manitoba Conservation. As a temporary measure to facilitate cell #3 retrofitting, consideration will be given to transferring selected portions of sludge to the existing IWWTF aerobic cell #1, #2 or the anaerobic cell if necessary to ensure that sufficient stabilization is provided prior to land application.

The side slopes of the existing aeration cell #3 will be re-graded from the existing 4:1 (H:V) slope to a 3:1 slope. Spoil material generated during the re-grading will be used to construct a new divider berm in the middle of the cell.

5.3.4 Outputs from Decommissioned Infrastructure

During the construction process, some underground pipes associated with the existing IWWTF will need to be decommissioned. The decommissioning process will include the flushing of the lines with water. Flushed water will be conveyed through existing infrastructure and the temporary transfer pipeline to the Town of Neepawa municipal cell #3. Once the lines are flushed, they will be capped and abandoned in place.

During the decommissioning of the anaerobic cell and aeration cells #1 and #2, a water cap will be placed in the cells and the cells will be isolated for a period of one year. After the isolation period, the water in the cells will slowly be decanted to the new IWWTF for treatment. Any sludge that may have accumulated in the cells will be applied to agricultural land in accordance with an accepted land application program.

The existing chlorination building will be kept however; the equipment within the building will be decommissioned and removed from the site. This equipment has not been used for at least 10 years and any materials generated from the decommissioning of the equipment will be removed in accordance with applicable regulations and will be disposed of/re-used/sold as appropriate.

The existing DAF unit at Springhill Farms will be decommissioned in accordance with applicable regulations and will be disposed of/re-used/sold as appropriate once the proposed IWWTF is in operation.

5.3.5 Other Wastes

Solvents, surplus building materials, used oils, package materials, etc. generated during construction will be transported from the site and disposed of, according to existing regulations, on a regular basis.

5.4 OPERATION OUTPUTS

5.4.1 Screenings

During the initial stage of the treatment train, the wastewater will be screened. Typical materials removed during the screening process will include sanitary wastes, straw and other small particles. Solids that are removed during the screening process will be transferred to a load-off bin located in the screening/pumping building. Approximately 300 kg (661 lbs) of screenings are anticipated to be generated on a daily basis. A truck will back into the screening/pumping building to collect the screenings. The entire load-off bin will be removed and replaced with an empty bin on a regular basis. Screenings will be sent to a landfill for final disposal.

5.4.2 Sanitary Wastewater

Sanitary wastewater will be generated at the proposed IWWTF in the employee rest room, break room and laboratory by about three employees. The quantity and quality of sanitary wastewater generated at the IWWTF is presented in the following table.

Table 5.3: Anticipated Sanitary Wastewater Produced by Proposed IWWTF

Item	IWWTF Sanitary Wastewater
Number of employees	3
Flow (m^3/day)	0.6
BOD (mg/L)	200
TSS (mg/L)	200
TKN-N(mg/L)	30
Total Phosphorus (mg/L)	8

The sanitary wastewater generated at the IWWTF will be directed to a sump where it will be pumped to the screens near the front of the treatment train in the IWWTF.

5.4.3 Treated Wastewater

Treated wastewater will be the most prominent output from the Town of Neepawa IWWTF. Approximately 1,520 m^3/day of treated wastewater will be discharged from the IWWTF when the hog processing plant is operating at full production. The discharge will occur on a continuous basis near the Whitemud River via the existing effluent outfall pipeline. The proposed IWWTF has been designed to remove nutrients from the effluent in accordance with the Province's nutrient removal guidelines. A summary of the effluent discharge criteria for the proposed IWWTF are listed in the following table with additional parameters anticipated to be included in Environment Act Licence effluent discharge limits.

Table 5.4: Effluent Discharge Criteria for Town of Neepawa IWWTF

Parameter	Value
Carbonaceous 5-day Biochemical Oxygen Demand ($CBOD_5$)	<30 mg/L (based on 30 day rolling average)
Total Suspended Solids (TSS)	<30 mg/L (based on 30 day rolling average)
Total Nitrogen (TN)	<15 mg/L (based on 30 day rolling average)
Total Phosphorus (TP)	<1 mg/L (based on 30 day rolling average)
Fecal Coliform	<200/100 mL (based on 30 day geometric mean)
Escherichia coli	<200/100 mL (based on 30 day geometric mean)

The proposed IWWTF will meet the limits listed in **Table 5.4**, with the upper boundary of the wastewater effluent meeting the stated limits. However, the typically anticipated effluent quality is expected to include TSS and BOD concentrations as low as 5 mg/L and total ammonia concentrations of less than 1 mg/L.

The effluent cooling process is anticipated to provide aeration and cooling for the treated effluent. The cascade aeration process is expected to elevate the dissolved oxygen levels of the effluent to near saturation at the IWWTF while the effluent will also be cooled to near ambient conditions (4ºC or 39.2 ºF in winter months). The effluent discharge on to the riprap will also provide some additional aeration.

It is not anticipated that there will be any significant monthly variations in the wastewater effluent quality and quantity. In the event of a long weekend, the flow rate from the flow attenuation tank to the remainder of the treatment train will be reduced or the IWWTF may run idle for a day. One day of idle time is not expected to have significant negative impacts on the IWWTF effluent treatment capabilities.

A portion of the treated effluent will be recycled for use at the facility. It is estimated that up to 190 m^3 of treated effluent will be chlorinated for reuse on a daily basis as non-potable utility water at the IWWTF.

Effluent flow and quality will be monitored on the outlet side of the UV disinfection units. Temperature and dissolved oxygen concentration will be monitored at the outlet of the cooling tower process.

5.4.4 Biosolids

Biosolids generated during initial treatment and during the waste activated sludge process will be pumped to one of two new sludge cells that will be constructed within the confines of the existing aeration cell #3. Three sludge streams will be generated at the proposed IWWTF consisting of:

- Sludge produced in the first stage DAF in the initial treatment process
- Sludge produced in the second stage DAF in the initial treatment process
- Waste Activated Sludge (WAS) produced at the membrane bioreactor

The first stage DAF sludge will be processed in a tricanter process to separate fat from the sludge. It is anticipated that approximately 136 kg (300 lbs) of fat will be produced per day. The fat will be transferred to a heated storage vessel and will be used to fuel the boiler for the tricanter process.

The two treatment DAFs are anticipated to generate approximately 1,200 kg (2,646 lbs) (dry weight basis) of biosolids per day. The membrane bioreactor process is anticipated to generate approximately 840 kg (1,852 lbs) (dry weight basis) of biosolids per day. The total amount of biosolids generated will be 2,040 kg (dry weight basis) per day.

Details on biosolids characteristics are included in **Appendix K**.

5.4.5 Domestic Solid Waste

General garbage will be divided into two categories: domestic waste and recyclable waste. Domestic waste will be disposed of at an authorized landfill. It is expected that approximately 400 kg/yr (882 lbs/yr) of domestic solid waste will be generated at the facility which will likely be disposed of at the Evergreen Environmental Technologies Landfill located west of Neepawa. A minimal amount of glass and paper will be generated by the employees which will likely be recycled under the Town of Neepawa’s existing recycling program.

5.4.6 Other Wastes

It is estimated that the back-up generator will require two nominal oil changes yearly. This is estimated to generate approximately 10 L of used oil per year. As a result, the proposed facility will register and obtain a provincial registration number in accordance with the Generator Registration and Carrier Licensing Regulation (Manitoba Regulation 175/87) under the *Dangerous Goods Handling and Transportation Act (DGHTA)*. All hazardous waste collected on-site will be handled and disposed of by authorized salvage dealers under the *DGHTA*.

The National Pollutant Release Inventory (NPRI) is a reporting procedure for any facility that manufactures, processes, or uses substances on the NPRI list in quantities of 10 tonnes or more per year and whose employees work in excess of 20,000 hr/yr collectively. The NPRI is a Canadian national inventory of chemicals released into the environment. It consists of 323 substances with specific information pertaining to the origin and activities involving the substance, the quantity released to the environment and the quantities to be shipped off-site as waste. This information is provided by the user, updated yearly and year-to-year variations must be explainable. The proposed IWWTF is not anticipated to use or emit any substances on the NPRI list in excess of the quantities listed above, and as such, is not required to follow the NPRI reporting procedure.

5.4.7 Atmospheric Emissions

Odour Emissions

The proposed IWWTF will generally utilize aerobic processes to treat wastewater and is expected to generate fewer odours than the existing IWWTF would generate under similar production conditions. Aerobic wastewater treatment typically generates fewer or less intensive odours than anaerobic wastewater treatment that is currently used in part of the existing IWWTF. Further, the proposed IWWTF will utilize considerably less open water surface than the existing IWWTF, which should also result in a reduction in odourous emissions compared to the existing IWWTF. Open water surface is further reduced by utilizing covered tanks where possible. The proposed treatment processes also allow for a higher level of system control than the existing IWWTF, further reducing odour emissions.

Screenings will be stored inside the screening/pumping building and be removed from the site on a regular basis to minimize odours.

To minimize odour generation and enhance stabilization during sludge storage, the sludge storage cells will include limited aeration during the fill cycle of each cell. Further, the separation of fat from the sludge in the first stage DAF unit will also help to reduce odours from the sludge storage. After the fill period, during the isolation period, the sludge cell will not be aerated and anaerobic conditions will likely occur. The aeration of the sludge during the fill process will reduce some of the chemical oxygen demand (COD) of the sludge which will reduce the amount of COD available for methane generation during the isolation period, when no aeration occurs. This should also reduce the odour generation potential of sludge storage at the proposed facility.

Ozone Precursors and Acid Precipitation Precursors

Ozone precursors typically include volatile organic compounds (VOCs), nitrous oxides (NO_X) and carbon monoxide (CO). Acid precipitation precursors typically include NO_X and sulfur dioxide (SO_2). Minor amounts of VOCs (such as methane) will be released as a product of combustion for process and building heat, back-up generator operation, and fat for fuelling the boiler. Relatively larger amounts of methane will be generated during the isolation period in the sludge storage cell when anaerobic conditions will likely occur. It is estimated that approximately 14.4 kg (32 lbs) of methane will be released on a daily basis (calculations are detailed in the Greenhouse Gas Emission Summary included in **Appendix L**).

Nitrogen oxides will also be generated during the combustion process. Consideration will be given to utilizing low NO_X boilers during the detailed design stage if appropriate.

Minor carbon monoxide and sulfur dioxide emissions will be generated during combustion of natural gas for process and building heat and the combustion of diesel fuel in the back-up generator. These emissions would be typical of this type of equipment.

Greenhouse Gas Emissions

To determine the greenhouse gas emissions related to the proposed upgraded IWWTF, a facility level greenhouse gas emission inventory was completed and is detailed in **Appendix L.** To provide a comparison and quantify the change in greenhouse gas emissions compared to the existing IWWTF, a facility level greenhouse gas emission inventory was also completed for the existing IWWTF.

As detailed in **Appendix L**, the existing IWWTF generates greenhouse gas emissions that are included in the Waste and Wastewater source category whereas the proposed facility will generate emissions included in both the Waste and Wastewater and the Stationary Fuel Combustion source category. The existing IWWTF generates greenhouse gas emissions as follows:

- Waste and Wastewater
  - Anaerobic cell – methane is produced in this uncovered cell due to anaerobic conditions
  - Municipal cell #3 – methane is produced in this uncovered cell due to anaerobic conditions

The existing IWWTF is estimated to produce approximately 360 kg (794 lbs) of methane on a daily basis which is equal to 7,561 kg (16,669 lbs) of carbon dioxide equivalent on a daily basis (see **Appendix L** for details).

The proposed IWWTF will generate greenhouse gas emissions as follows:

- Stationary Fuel Combustion
  - Natural gas use – carbon dioxide, methane and nitrous oxide is generated in the combustion of natural gas for process and building heat
  - Diesel fuel use - carbon dioxide, methane and nitrous oxide is generated in the combustion of diesel fuel in the backup generator
  - Fat use - carbon dioxide, methane and nitrous oxide is generated in the combustion of fat for process heat

- Waste and Wastewater
  - Sludge cell – methane is produced in this uncovered cell in the isolation period due to anaerobic conditions

The proposed IWWTF is estimated to produce approximately 699 kg (1,541 lbs) of carbon dioxide, 14.4 kg (32 lbs) of methane and 0.01 kg (0.022 lbs) of nitrous oxide on a daily basis which is equal to 1,005 kg (2216 lbs) of carbon dioxide equivalent on a daily basis (see **Appendix L** for details).

Water Vapour

Water vapour may be generated from the uncovered anoxic tank, aerobic tanks, the cascade-cooling process and the sludge cell during cooler months. However, as the surface area of the exposed water surface will be greatly reduced from the current surface area of the IWWTF, water vapour generation will likely be reduced from the current water vapour generation of the existing IWWTF.

Transportation Emissions

During the start-up and operational phase of the project, air emissions will be generated by employee traffic, chemical delivery trucks, screenings disposal trucks and trucks utilized in the annual biosolids application program. These emissions may include fugitive dust, odours and air emissions typical of vehicular exhaust.

Noise Emissions

During operation, noise will be generated by pumps and blowers. Pumps and blowers will be housed within the proposed buildings, limiting potential noise emissions. Blowers for sludge cell aeration will be housed within the existing blower building located to the south-east of the sludge stabilization cells. These blowers will also have integral sound enclosures which will also significantly reduce their noise emissions.

Noise will be generated during the backup generator exercise which will occur for approximately 2 hours per month.

Minor noise typical of heavy trucks will be generated during the annual biosolids land application program and other truck deliveries.

5.4.8 Surface Runoff

Surface runoff will be generated from paved and compacted gravelled areas, the building roofs as well as grassed areas of the property during precipitation events and during spring snow melt. The site will be designed so that drainage from precipitation will drain away from facilities to a natural drainage swale between the new IWWTF and the existing IWWTF. The proposed buildings and tanks will be placed on mounded areas to ensure that drainage flows away from the new proposed facilities.

Storage tanks and the sludge cells will be inspected on a regular basis for leaks and damage to ensure that pollutants are not transported off-site by surface runoff.

The drainage ditch which will be installed along the new proposed site access road will also drain to the west and will be designed to accommodate a 1 in 100 year storm event.

5.5 PROCEDURES

5.5.1 Good Housekeeping

Regular inspection of the IWWTF site will be undertaken and fugitive debris will be collected and disposed of on a regular basis. Within the screening/pumping building and the treatment building, regular housekeeping is essential to efficient plant operation. Chemical storage areas will be inspected and cleaned on a regular basis. Domestic waste will be removed from the rest room, break room and laboratory on a regular basis. Further, efforts will be made to ensure that slippery materials are picked up off the floor and that isles/walkways are kept clear.

5.5.2 Regular Inspections

All proposed steel tanks will be installed on concrete foundations and will be hydraulically tested prior to commissioning to ensure that there are no leaks. The proposed sludge cells will be relined with a conductive HDPE liner system which will convey flow between the liners to a sump. During the liner installation process, testing of the joints/connections will be conducted. Testing of the conductive liner using a high voltage wand will also be completed during the installation process as an additional quality assurance check. In operation, potential leaks will be identified by regular monitoring of the sump pit connected to the liners.

Regular inspections will occur both inside and outside of the proposed facility by Town of Neepawa staff.

Within the proposed facility, periodic inspections will be completed by trained and qualified employees to determine whether the equipment is in good working condition and to determine the need for equipment repair or replacement. Inspections will also be conducted to ensure that employees are following safe procedures, and to confirm that spills and accidents are being reported properly.

Observations will also be completed by trained and qualified employees outside of the plant building to ensure that all aboveground tanks and sludge cells are functioning properly and are not showing signs of stress or failure.

5.5.3 Spill Prevention

To prevent spills, all workers will be trained in appropriate safety and handling procedures for equipment, chemicals and products. Chemicals will be supplied to the various treatment processes automatically via sensors and pumps. To prevent spills or leaks during the treatment process, each unit process has redundant or backup equipment which will be monitored with level transmitters and fail-safe high level alarm features. If a pump or unit process fails, plant staff will be notified through the main programmable logic controller.

To prevent spills from aboveground tanks, quality assurance testing will be conducted throughout the tank installation process. All tanks will undergo leak testing after assembly. Typically after the first year of operation, a tank warranty inspection will be completed. Visual assessment of tank integrity will be conducted on a regular basis by qualified and trained operators during facility operation.

The existing aeration cell #3 will be retrofitted and relined for sludge storage. The liner system will consist of high density polyethylene (HDPE) geocomposite media with single sided non-woven geotextile on the soil side for gas venting, an 80 mil HDPE conductive containment liner plumbed to a monitoring sump, HDPE geocomposite media to convey leakage flow between the liners, followed by a final primary inner layer of 80 mil HDPE conductive liner. After installation of each conductive liner layer, the liner will be tested and any identified leaks will be repaired prior to operation. During operation, leaks will be identified by monitoring the sump connected to the liners.

To prevent spills from aboveground tanks due to collisions with trucks, snow clearing equipment, employee vehicles etc. concrete bollards will be placed around tanks where applicable.

5.5.4 Spill Containment, Recording and Reporting

On-site chemical storage tanks for metal salt, sodium hypochlorite and polymer will be equipped with a secondary containment system with a 110% volume capacity to prevent a spill from spreading. Within these chemical storage areas, there will be no floor drains.

There will be a designated person responsible for spill recording and reporting to Manitoba Conservation’s Emergency Response Team as required.

The proposed facility will also have spill intervention kits located at strategic points where incidents are thought to be of highest probable occurrence. These kits may include items such as; absorbent rolls, granular absorbents, rubber drain seals, cement to seal tank leaks etc. Designated employees will also be trained in spill kit use.

5.5.5 Emergency Response Plan

As part of the design process, an operation and maintenance manual will be developed for the IWWTF. This will include the development and implementation of an Emergency Response Plan (ERP) for the proposed facility.

The purpose of the ERP will be to ensure responses to emergencies are prompt and to protect the health and safety of all employees. The Town of Neepawa will keep the plan up to date with current regulations, standards and procedures to be followed by all employees. All employees will be assigned specific tasks to undertake in the event of an emergency.

5.6 PROCESS UPSET

5.6.1 Fire

During the construction stage of the proposed facility, there exists the potential for fires at the work site, involving mechanical equipment and fuels. During normal operation there is potential for fires (associated with pumps, electrical components etc.). To prevent fire hazards at the site, the following precautions will be taken;

- All flammable waste will be removed on a regular basis and disposed of at an approved disposal site.
- All refuelling of equipment in the construction stage will occur in a designated refuelling area equipped with spill kits.
- All refuelling of the backup generator during operation will occur in a designated refuelling area located on a concrete pad equipped with spill kits.
- Fire extinguishers will be available at the construction site as well as in the proposed buildings. Such equipment shall comply with, and be maintained to, the manufacturers' standards.
- All fire prevention/response equipment will be checked on a routine basis in accordance with local fire safety regulations to ensure the equipment is in proper working order at all times.
- Greasy or oily rags or materials subject to spontaneous combustion (including waste oils) shall be deposited and stored in appropriate receptacles. This material shall be removed from the site on a regular basis and shall be disposed of at an approved waste disposal facility.

Currently there is a hydrant loop around the Springhill Farms processing facility. Hydrant service at the IWWTF site will rely upon this loop in the event of a fire. This fire main will be extended if necessary to comply with the Manitoba Fire Code

Chemical storage areas as well as the proposed IWWTF buildings will comply with National Fire Protection Association - Standard 820: Standard for Fire Protection in Wastewater Treatment and Collection Facilities and the Manitoba Fire Code. Further, the use of sugar as opposed to methanol as a carbon source, is an additional fire protection measure that has been implemented in the proposed facility design.

In the event of a fire at the proposed facility, it is expected that pollutants similar to those of any typical industrial fire may be present. Bulk storage of all chemicals in relation to fire protection will be designed in accordance with the requirements of the Manitoba Fire Code.

5.6.2 Accidental Spills and Releases

Accidental spills and releases can potentially liberate large amounts of pollutants, depending on the size of the spill.

During the construction stage of the project, there is potential for fuel and chemical spills. Further, transportation accidents can result in the accidental release of hazardous materials and/or equipment fluids.

During the operational stage of the project, the proposed facility chemical storage areas for metal salt, polymer and sodium hypochlorite will be equipped with secondary containment to reduce the potential for pollutant release due to spills. In the event of a spill, appropriate mitigation measures will be enacted to recover the materials and/or restrict migration of pollutants in a safe manner.

To prevent spills from occurring during project activities, the following procedures will be employed.

- All potentially hazardous products will be stored in a pre-designated, safe and secure product storage area at the work site in accordance with applicable legislation.
- Storage sites will be inspected periodically for compliance with licence requirements.
- Should refueling be required on-site, refueling areas will be equipped with secondary containment facilities.
- Service, fuelling, and minor repairs of equipment performed on-site are only to be performed by trained personnel.
- All machinery fuel tanks will not be filled to full capacity so as to minimize the potential for overflow due to overfilling or expansion of product under high temperature conditions.
- Any used oils or other hazardous liquids are to be collected and disposed of according to provincial requirements.
- Vehicles are to be maintained to minimize leaks. Regular inspections of hydraulic and fuel systems on machinery shall be completed on a routine basis. If leaks are detected, they are to be repaired immediately.
- Chemical transfer/feeding shall be completed by trained personnel only.

- All on-site staff will be trained in how to deal with spills.

Chemicals required during operation shall be stored at the IWWTF within the treatment facility buildings in accordance with applicable legislation. Chemicals stored at the IWWTF will only be handled by trained and qualified personnel.

5.6.3 Transport Accidents

As chemicals, screenings and biosolids are to be transported to/from the site by truck, there is potential for pollutant release due to transportation accidents. If the accident occurred between two vehicles, then any liquid found in a vehicle such as, gasoline or diesel fuel, antifreeze and oil, can be released to the environment as well as the material the vehicles were transporting. Dangerous goods transported to or from the plant site will be transported in accordance to the *DGHTA.*

To prevent potential transportation accidents, qualified companies will be retained to deliver and transport materials to and from the IWWTF. If required, site speed limits will be imposed and appropriate signage erected to reduce potential transportation accidents.

5.7 DEGREE OF RECYCLING, WASTE MINIMIZATION AND ENERGY EFFICIENCY

A portion of the treated membrane permeate will be chlorinated and will be re-used as non-potable utility water at the proposed facility. This water will be used for screen wash-water, chemical feed dilution water and truck wash water in the Springhill Farms truck wash facility. Some of this water may also be used for cleaning at the IWWTF. It is estimated that up to 190 m^3 of treated effluent may be reused on a daily basis and is an internal recycle to the water volumes presented earlier. The reuse of this water will reduce the potable water demand of the proposed facility.

Where possible, existing infrastructure will be re-used in the proposed facility to minimize the waste generated by the proposed project. The existing aeration cell #3 will be retrofitted and will be re-used. The existing effluent outfall pipeline will also be re-used by the proposed facility. The existing anoxic tank may be reused to provide storage of chlorinated non-potable utility water. The existing blower building located to the east of the aeration cell #3 will also be re-used.

Biosolids generated at the proposed facility will be applied to agricultural land on an annual basis. The biosolids provide a valuable fertilizer resource to agricultural land and provide a sustainable alternative to landfill disposal.

During the detailed design stage, potential energy efficiency measures that can be undertaken will be examined as they are identified.

Paper and glass waste generated by employees at the facility will be recycled under the Town of Neepawa's existing recycling program.

5.8 MATERIAL BALANCE

Inputs and outputs of the proposed facility are summarized in **Table 5.5**. Bulk inputs to the wastewater treatment process are; raw wastewater, polymer, metal salt, magnesium hydroxide, sodium hypochlorite and sugar. Citric acid will be used for membrane cleaning. General cleaning chemicals such as bleach will also be used for cleaning the facility. Potable water will be supplied to the site for use in the laboratory, break area and restroom as well as for dissolving sugar for chemical dosing to the post anoxic tanks. Diesel fuel will be required for the backup generator.

Bulk outputs of the proposed facility include treated wastewater, fat for use in an on-site boiler and biosolids for land application.

Table 5.5: Inputs and Outputs to the proposed IWWTF

Material	Quantity
INPUTS	
Raw wastewater	10,640 m^3/week
Polymer	20-30 L/day
Metal salt	950 L/day
Magnesium hydroxide	1,035 L/day
Sodium hypochlorite	2,600 L/year
Sugar	132 kg/day
Citric acid	1,670 L/year
General cleaning chemicals	Minimal use
Potable water	1,500 L/day
Diesel fuel	38 L/month
OUTPUTS	
Treated wastewater	1,520 m^3/day
Fat for use in an on-site boiler	136 kg/day
Biosolids for land application	2,040 kg/day

5.9 WATER USE

Potable water will be supplied to the site for use in the laboratory, break room and employee rest room as well as for a minimal amount of cleaning. Potable water may also be used to dissolve the sugar for dosing to the post anoxic tanks. It is estimated that the proposed facility will utilize approximately 1,500 L/day of potable water.

Disinfected permeate will be chlorinated and will be re-used as non-potable utility water at the site. It is estimated that up to 190 m^3/day of water will be recycled and re-used on a daily basis.

5.10 DECOMMISSIONING

Currently, the anticipated lifespan of the proposed facility is over 20 years. As a result, there are no detailed decommissioning plans in place at this time. **Section 10.0** includes a description of the general steps that will be followed in the decommissioning of the proposed facility. As relevant rules and regulations pertaining to the decommissioning of the proposed facility will be followed, pollutant exposure levels from the proposed facility and site during decommissioning are expected to be minimal.

Section 6.0
Environmental Impact Assessment

SECTION 6.0
ENVIRONMENTAL IMPACT ASSESSMENT

6.1 APPROACH TO IMPACT ASSESSMENT

The purpose of this Notice of Alteration (NOA) is to identify and describe any potential environmental impacts that may occur as a result of the construction and operation of the proposed Industrial Wastewater Treatment Facility (IWWTF) that is required to treat the wastewater from the existing Springhill Farms pork processing facility.

Information on the environmental components of the study was collected from published information and maps in addition to field reconnaissance work in 2007 and 2008.

Potential environmental impacts were identified by superimposing project elements onto existing natural conditions and applying standard mitigative measures. An underlying assumption of this method is that the IWWTF will be constructed with due care for safety and environmental matters, using current and reasonable engineering practices. Wherever possible, major upsets and deviations from normal construction conditions have been taken into account in the assessment.

Various terms have been used to identify and describe the potential impacts assessed. **Table 6.1** provides an explanation of these terms.

Table 6.1: Explanation of Terms Used in Impact Assessment

Project Phase:	Refers to the phase of the project as construction, operation or decommissioning of the proposed facility.
Potential Impact:	Classification of the type of impacts anticipated during a specific project phase.
Magnitude of Impact:	Refers to the estimated percentage of population or resource that may be affected by activities associated with the construction, operation and decommissioning of the proposed IWWTF. Where possible and practical, the population or resource base has been defined in quantitative or ordinal terms (e.g., hectares of soil types, units of habitat). Impact magnitude has been classified as either less than (<) 1%, 1 to 10%, or greater than (>) 10% of the population, or resource base. Where the magnitude of an impact has been defined as virtually immeasurable and represents a non-significant change from background in the population or resource, the impact is considered negligible. An exception to this is in terms of potential human health impacts where, for example deaths due to waterborne disease amounting to 1% of the population would still be considered major.
Direction of Impact:	Refers to whether an impact to a population or a resource is considered to have a positive, negative or neutral effect.
Duration of Impact:	Refers to the time it takes a population or resource to recover from the impact. If quantitative information was lacking, duration was identified as short-term (<1 year), moderate term (1 to 10 years) and long term (>10 years).
Frequency of Impact:	Refers to the number of times an activity occurs over the project phase, and is identified as once, rare, intermittent, or continuous.
Scope of Impact:	Refers to the geographical area potentially affected by the impact and was rated as local, or regional, or provincial. Where possible, quantitative estimates of the resource affected by the impact were provided.
Degree of Reversibility:	Refers to the extent an adverse impact is reversible or irreversible over a 10-year period.
Residual Impact:	A subjective estimate of the residual impact remaining after employing mitigation measures in reducing the magnitude and/or the duration of the identified impacts on the environment.

Magnitude of Impact	Direction of Impact	Duration of Impact	Frequency of Impact	Scope of Impact	Degree of Reversibility of Impact
Negligible (immeasurable)	Positive	Short term (< 1 year)	Once	Local	Reversible
Minor (<1%)	Negative	Moderate (1 to 10 years)	Rare	Regional	Irreversible
Moderate (1 to 10%)	Neutral	Long term (>10 years)	Intermittent	Provincial	
Major (>10%)			Continuous		

The following subsections address the various components of the environment which are anticipated to be affected by the proposed construction and operating activities. The potential impacts on specific environmental parameters are described in terms of relative or absolute significance, where possible. Impacts are defined as negligible, minor, moderate or major according to terms in **Table 6.1.** Mitigation measures for minor, moderate and major magnitude impacts are detailed in **Section 7.0 Mitigative Measures**. Impacts that are negligible in magnitude are considered sufficiently mitigated and no further mitigation measures are proposed. **Table 7.1** at the end of **Section 7.0**, provides a brief summary of the anticipated potential impacts and mitigative measures for the construction and operation phases of the proposed project.

For the purposes of this study, the extent of impacts were analyzed as:

- Local: 3 km radius from the proposed IWWTF site
- Regional: 10 km radius from the proposed IWWTF site
- Provincial: within the Province of Manitoba

For the purposes of this environmental impact assessment, impacts were assessed for the maximum wastewater production capacity (1,520 m^3/day) of the proposed IWWTF.

6.2 AIR QUALITY IMPACTS

6.2.1 Construction Phase

Exhaust Emissions

There exists potential for negative air quality impacts due to emissions from construction equipment operating on-site during construction activities. It is estimated that there will be 30 emission sources or less at any one time at the site during the construction process, including worker vehicles and heavy equipment. Vehicle and equipment exhaust emissions are anticipated to result in a potentially minor decrease in air quality on the site and a negligible decrease in air quality off the site. These negative impacts will be of short term duration, potentially occurring on a continuous basis during working hours of the construction period on a local scale.

Airborne Dust and Particulates

Potential impacts to air quality may be caused due to airborne dust and particulates during construction activities from vehicle movement along site roads, from earthworks and from demolition activities. Dust has the potential to negatively impact air quality with subsequent potential impacts to human health and flora (dust deposition). As the disturbed area will be kept to a minimum as much as possible with the construction occurring in stages, impacts to air quality due to airborne dust and particulates will be negative, negligible in magnitude, occurring intermittently over the short term on a local scale.

Odours

During the construction phase, there is potential for odour generation due to paint, asphalt, adhesives and solvent use as well as the de-sludging of cells to be retrofitted and decommissioned. The closest resident to the proposed IWWTF site is located approximately 330 m to the south-east of the proposed site. It is anticipated that with this buffer zone to the nearest resident, odours generated due to construction will be negligible.

Odours generated during the de-sludging process will likely be disbursed by wind. Further, the vegetation surrounding the existing IWWTF and the nearest residential receptor is also anticipated to disburse potential odours. Therefore any odour impacts generated during the de-sludging process will likely be negligible in magnitude. Negative odour impacts during the cell decommissioning are anticipated to occur intermittently over the short term on a local scale.

Greenhouse Gas Emissions from Construction Equipment Exhaust

During construction activities, greenhouse gas emissions typical of diesel construction vehicle exhaust will be generated including carbon dioxide, methane and nitrous oxide. As indicated previously, an estimated maximum of 30 emission sources including worker vehicles and heavy equipment will be on-site at any one time. The greenhouse gas emissions created during the construction phase of the project are anticipated to be negative and continuous during the working hours of the construction project to varying degrees but overall will be negligible in magnitude, Provincial in scope with impacts occurring over the long term.

Vehicle, Heavy Equipment and Construction Noise

Noise and vibration will be generated to varying degrees during construction activities and have the potential to influence people in the surrounding area and local fauna. Construction noises may be expected to arise from the use and arrival of heavy equipment at the site, increased traffic, and associated construction noises. The construction phase noise is expected to be typical of heavy equipment, such as trucks and backhoes. As well, noise from tools, such as hammers, is expected throughout the construction phase. As the proposed building foundations will be slab on grade construction, pile driving is not anticipated to be required.

Due to the limited noise generation during the construction process and as the proposed site is located in a relatively busy area (near to PTH 16 and the Springhill Farms facility), noise impacts due to the construction process are anticipated to be minor to negligible in magnitude, of short term duration, occurring intermittently during the construction phase on a local scale.

6.2.2 Operational Phase

Vehicle Exhaust Emissions

During the operational phase, there will be increased traffic to/from the site due to material deliveries, screenings disposal and during the biosolids land application program. The increased traffic will result in an increase of total vehicle emissions with potential negative impacts to air quality. The magnitude of the incremental increase in traffic due to material deliveries and screenings disposal traffic is anticipated to be negligible as detailed in **Section 6.8**. As a result, the increase in emissions associated with material deliveries and screenings disposal traffic is also considered negligible.

The additional traffic created as a result of the annual biosolids land application program is anticipated to increase traffic in the local area by approximately 3.5% on a daily basis as detailed in **Section 6.8**. During the application program, there will likely be less than ten vehicles at the site at one time. Further, vehicle idling will be kept to a minimum to reduce exhaust emissions. This increase in traffic is anticipated to create a minor increase in vehicle emissions in the local area. This minor increase in vehicle emissions is anticipated to have negative, short term, intermittently occurring impacts on air quality.

Airborne Dust and Particulates

There is potential for the generation of fugitive airborne dust and particulates during the operational phase of the project due to traffic movement on site gravel roads. The intermittent increase in traffic entering and leaving the site during the 2 week biosolids application program has the potential to cause an increase in airborne dust and particulates at the site that is expected to be minor in magnitude at the site boundaries and will likely be negligible on a local scale. As the traffic levels will be significantly lower during the remaining 50 weeks of the year (as detailed in **Section 6.8**) local impacts will be negligible for the majority of the year. Airborne dust and particulates can create negative impacts on air quality and subsequent negative impacts to humans and flora (due to dust deposition). As part of the biosolids application program, dust mitigation measures will be employed including watering gravel roads to reduce dust emissions if required in areas near residential development.

It is anticipated that negative impacts due to airborne dust and particulates will be negligible on a local scale, occurring over the short term on an intermittent basis.

Odours

During operation, there is potential for odour generation due to wastewater treatment processes, screenings storage prior to disposal, sludge stabilization and biosolids land application. The design of the proposed IWWTF includes measures to reduce potential odour emissions.

The proposed IWWTF will utilize considerably less open wastewater surface area than the existing IWWTF (approximately a 36% reduction in open wastewater area), which is expected to result in a reduction in odourous emissions compared to the existing IWWTF. Further, much of the treatment processes are aerobic or anoxic which will minimize methane-produced odours. Anaerobic conditions will likely develop during the sludge isolation period in the new sludge storage cells. Methane generation from biosolids during the isolation period is expected to be minimal as the sludge will undergo stabilization in the form of aeration while the cell is filling. Once the cell enters the isolation period the COD remaining in the sludge for methane generation will be much reduced compared to the amount of methane produced by the existing anaerobic cell, resulting in less odour emissions. The separation of the fat from the sludge produced in the first stage DAF unit of the initial treatment process will also help to reduce odours during sludge storage.

Odours from screenings removed during initial treatment will be reduced by storing screenings indoors and removing them on a regular basis.

To mitigate odour impacts during biosolids land application, biosolids will be applied to land by shallow injection to minimize the exposed area of biosolids available for odour generation.

It is anticipated that there will be a negligible to minor reduction in odour impacts compared to the existing facility. This positive impact will occur intermittently over the long term on a local scale.

Greenhouse Gas Emissions from IWWTF

As detailed in **Appendix L**, a facility level estimate of greenhouse gas emissions associated with the existing IWWTF and the proposed IWWTF was completed. As detailed in **Appendix L**, the proposed IWWTF will result in an 87% (2,393 tonnes CO_2e per year) reduction in greenhouse gas emissions. The reduction in greenhouse gas emissions is mainly due to the use of aerobic treatment processes (excluding sludge isolation when anaerobic conditions will occur). This reduction in greenhouse gas emissions is considered to be a major positive impact at the facility level. To determine the magnitude of the reduction at the Provincial level, the greenhouse gas emissions reported for the Province of Manitoba in 2006 in Canada's National Inventory Report 1990-2006 were examined (Environment Canada, 2008b). According to the report, the Province of Manitoba emitted a total of 21,200,000 tonnes of CO_2e. The reduction of 2,393 tonnes CO_2e achieved by the proposed IWWTF is considered to be a negligible decrease in greenhouse gas emissions at the Provincial level.

The reduction in greenhouse gas emissions are anticipated to result in a major positive facility level impact and a negligible Provincial level impact which will continuously occur over the long term.

Noise due to IWWTF Operation

Noise impacts may occur during IWWTF operation due to the use of pumps and blowers and the backup generator as well as noise due to vehicles arriving/departing the IWWTF site.

Noise impacts due to pumps and blowers are anticipated to be negligible as equipment will be located within the proposed screening/pumping and treatment buildings as well as the existing blower building located to the south-east of the proposed sludge cells. Blowers will also include integral sound enclosures to reduce noise emissions.

Noise due to backup generator use is also anticipated to be negligible, as the generator will only run for a few hours on a monthly basis. Further, the separation distance of 330 m to the closest receptor is also anticipated to reduce the magnitude of potential noise impacts.

As indicated previously, the incremental increase in traffic due to material deliveries and screenings disposal traffic is anticipated to create a negligible increase in traffic, therefore negligible noise impacts are anticipated.

The increase in traffic during the annual biosolids land application program is anticipated to create a short term increase traffic in the local area by approximately 3.5% as detailed in **Section 6.8**. During the application program, there will likely be less than ten vehicles at the site at one time. Further, vehicle idling will be kept to a minimum to reduce noise emissions. As biosolids application will occur during the fall, when there is increased activity in the local area and region due to harvesting etc., this increase in traffic is anticipated to create negligible to minor negative noise impacts in the local area intermittently during the one to two week biosolids application program.

6.3 GROUNDWATER IMPACTS

6.3.1 Construction Phase

Fuel and Chemical Spills

As the Neepawa area is located in a groundwater pollution hazard area, fuel and chemical spills have the potential to cause negative impacts to groundwater resources. During the construction phase, potential spills could include vehicle fluids such as diesel fuel and oils as well as any chemicals or solvents used in the construction process. On-site re-fueling during the construction phase could result in fuel spills on the site. Therefore on-site refueling would be conducted in a dedicated refueling area constructed of clay or otherwise lined and slightly bermed to contain any negative effects from a fuel spill. Chemicals and solvents required during the construction process will be stored in the refueling area or a similarly protected area if possible. Potential spills could result in minor to moderate negative impacts to groundwater resources. Impacts would have a local scope of influence and would likely occur on a rare basis. Depending on the material released to the environment during a spill, impacts could occur over the short to moderate term.

6.3.2 Operational Phase

Fuel, Chemical and Biosolids Spills

During the operational phase of the project, there is potential for negative groundwater impacts due to fuel, chemical and biosolids spills. Diesel fuel will be required at the site for the backup generator, however no significant aboveground or underground fuel storage tanks will be required at the site. As chemical dosing will be required at the proposed IWWTF, there is potential for chemical spills during the facility operation. Secondary containment will be provided for polymer, metal salt and sodium hypochlorite to prevent potential impacts to groundwater due to spills. During the annual biosolids application program, biosolids will be pumped from the sludge cell and will be hauled to application sites by truck. During this process, there is potential for spills of biosolids due to pumping malfunctions from the sludge cell as well as potential traffic accidents. To reduce the potential for groundwater impacts due to biosolids spills, experienced and qualified applicators will be retained for the program.

As indicated previously, the Neepawa area is located in a groundwater pollution hazard area. As such, potential fuel, chemical and biosolids spills could result in minor negative impacts to groundwater resources. Impacts would have a local scope of influence and would likely occur on a rare basis. Depending on the material released to the environment during a spill, impacts could occur over the short to moderate term. Further, the use of the shallow aquifer for potable water supply in the surrounding area necessitates proper mitigation measures. Mitigation measures are discussed further in **Section 7.2.**

Leakage from Sludge Cells, Pipelines and Aboveground Tanks

During operation of the IWWTF, seepage of effluent or partially treated effluent into the ground can potentially impact groundwater. Potential leakages from the proposed IWWTF would include the sludge cells, pipelines and aboveground tanks.

To prevent potential impacts to groundwater due to sludge cell leakage, a new double HDPE liner system will be installed to provide primary and secondary containment for the relined sludge cells in addition to the existing clay cell construction already in place in the existing IWWTF aeration cell #3.

To prevent pipeline leakages, new pipes will be tested prior to operation to identify any potential leaks. It is proposed that PVC pipes be used which also provide low leak potential. The existing outfall pipeline which will be re-used presents a lower potential for groundwater impacts from leaks as this line is a gravity pipeline. Further, in the event of a leak of this pipeline, any leaks would be of treated effluent therefore minimizing potential impacts.

The proposed aboveground storage tanks will be engineered to provide sufficient capacity for the system and will be constructed on top of concrete foundations with appropriate quality control inspections conducted during construction. Furthermore, the tanks will be hydraulically tested prior to operation. Typically after one year of operation, a warranty inspection of the aboveground tanks will be completed. Regular visual observations on tank condition during operation will be made to identify any potential stresses or indications of failure as part of the ongoing maintenance inspection routine at the IWWTF.

As indicated in **Section 2.4.2**, groundwater gradients at the existing IWWTF indicate that groundwater likely flows in a northerly direction towards the Whitemud River. There are no registered wells in the quarter section directly north of the site (NW ¼ 35-14-15-W), downgradient of the site based upon the apparent near-surface groundwater flow direction. However, the use of the shallow aquifer for potable water supply in the surrounding area necessitates proper mitigation measures. Mitigation measures are discussed further in **Section 7.2.** Wastewater leakages have the potential to cause minor negative impacts to groundwater resources. These impacts would be considered short to moderate term in duration occurring rarely on a local scale.

Biosolids Application Impacts

Biosolids will be applied to land annually in accordance with the Nutrient Management Regulation and any additional requirements as set out in the Environment Act Licence. If biosolids are applied at inappropriate rates or at inappropriate locations (such as near a well) potential impacts to groundwater resources can occur including nutrient leaching. The Nutrient Management Regulation has general setback requirements for biosolids application from specific water features and it is anticipated that the Environment Act Licence could include additional requirements for groundwater protection during the application program such as minimum setback distances to groundwater wells, recharge areas, etc. Groundwater impacts have the potential to be negative, occurring over the short to moderate term, locally on a rare basis, however are anticipated to be negligible in magnitude.

6.4 SURFACE WATER IMPACTS

6.4.1 Construction Phase

Fuel and Chemical Spills

During the construction phase, potential spills could include vehicle fluids such as diesel and oils as well as any chemicals or solvents used in the construction process as indicated in **Section 6.3.1**. The closest surface water is the Whitemud River located approximately 700 m (2,300 ft) from the proposed IWWTF site. If on-site refueling is required during the construction process, it will be conducted in a dedicated protected area. Further, chemicals required for the construction process will be similarly stored if possible. The separation distance to the closest surface water and the use of a protected refueling area will result in negligible impacts to surface water due to fuel and chemical spills. Surface water impacts have the potential to be negative, of short term duration, locally occurring on a rare basis.

Waste Disposal Practices

During construction, there exists the potential for impacts to surface water due to inappropriate waste disposal at the site. Construction and decommissioning debris, if not disposed of correctly, can potentially be transported by surface runoff to surface water bodies resulting in negative water quality impacts and subsequent impacts to aquatic resources and aesthetics. To prevent potential impacts to surface water due to inappropriate waste disposal practices, waste will be disposed of in appropriate containers on a regular basis.

The closest point on the Whitemud River to the proposed IWWTF site is approximately 700 m (2,300 ft) from the IWWTF but drainage ditches would likely convey flows approximately 1.8 km (1.1 mi) to a point where the mile roads intersect with the Whitemud River to the northwest of the IWWTF. With this separation distance, it is not anticipated that waste and debris will be transported from the site to the river by surface runoff. The impact to surface water resources is therefore anticipated to be negligible. Surface water impacts have the potential to be negative, of short term duration, locally occurring on a rare basis.

Sediment and Turbidity

During the construction phase, there is potential for erosion, due to disturbed soils and material stockpiles. Erosion can result in negative impacts to surface water due to turbidity and sediment accumulation. Gravel and salvaged topsoil may be temporarily stockpiled at the site for use in the construction and re-vegetation process. Erosive action due to heavy precipitation and winds can result in the loss of soil resources and potential subsequent impacts to surface water and aquatic resources. To minimize the disturbed area, construction will occur in a staged process. Based on the separation distance to the Whitemud River from the proposed IWWTF site, potential impacts to surface water quality due to sediment accumulation and increased turbidity are anticipated to be negligible in magnitude occurring intermittently over the short term on a local scale.

6.4.2 Operational Phase

Fuel, Chemical and Biosolids Spills

During the operational phase of the project, there is potential for negative surface water impacts due to fuel, chemical and biosolids spills as indicated in **Section 6.3.2**.

Based on the distance to the Whitemud River (700 m (2,300 ft) from the proposed IWWTF site), secondary containment for chemicals where required, the use of qualified biosolids applicators and limited fuel usage during operation, surface water impacts due to spills have the potential to be negligible in magnitude. Impacts would have a local scope of influence and would likely occur on a rare basis. Depending on the material released to the environment during a spill, impacts could occur over the short to moderate term.

IWWTF Discharge

During the operational phase of the project, the primary impact on surface-water quality to arise from the proposed IWWTF upgrade will be improved water quality in the Whitemud River due to enhanced treatment of the industrial effluent. Further, as the IWWTF effluent will no longer be routed through the Municipal Lagoon Cell #3 prior to discharge to the river, water quality in the river will also benefit from additional treatment (longer retention time), provided by Municipal Cell #3, of the Town of Neepawa municipal wastewater. **Table 6.2** summarizes the concentrations of TSS, BOD_5, ammonia, and nutrients in the existing effluents, proposed effluents, and the Whitemud River upstream of the effluent outfalls.

Under the existing operating regime of the Town of Neepawa municipal lagoon system, the municipal and industrial effluents are discharged alternately from May to October, and intermittent periods occur in which neither effluent is discharged to the river. Following project completion, the periodic discharges of industrial wastewater effluent that currently occur from Municipal Cell #3 under emergency discharge orders will be replaced by a year-round constant discharge of treated IWWTF effluent. Currently the emergency discharges range from approximately 1.8-9.9 ML/day (based on reported emergency discharge data to Manitoba Conservation) while the constant discharge will be up to 1.52 ML/day. The additional retention in Municipal Cell #3 of the municipal effluents will allow their discharge to the river at a rate lower than the current rate, over a total of up to sixteen weeks between May 16 and October 31, compared to the eight weeks (approximate) of discharge under the current operating regime. The changes in the loading rates of BOD, ammonia and nutrients to result from the changes in effluent quality and altered discharge rates are summarized in **Table 6.3**.

As shown in **Table 6.3**, the proposed IWWTF upgrade will reduce maximum ammonia discharge rates in the industrial effluent by 99%. This reduction, together with anticipated reductions in municipal effluent discharge rates and ammonia concentrations, will result in a total ammonia discharge rate of up to 91 kg/day in the effluents when discharged simultaneously, considerably less than either the municipal (219 kg/day) or the industrial (140 kg/day) effluent discharges under the existing discharge scenario (Table 6.3). At a base flow in the river of 0.2 m^3/s and a background ammonia concentration of 0.12 mg/L, this reduced loading will decrease the fully-mixed ammonia concentration in the river downstream of the effluent discharge points from approximately 6.5-8.4 mg/L (with the existing industrial and municipal effluents, respectively,) to approximately 3.9 mg/L (with the combined effluents). During the winter (assuming a base flow of 0.2 m^3/s), the discharge from the IWWTF will raise ammonia concentrations in the river by 0.1 mg/L. Based on the average ammonia concentration during the winters of 1990 and 1991, the average fully-mixed concentration would be approximately 1 mg/L, well below the lowest Manitoba Surface Water Quality Objective for protection of cool-water aquatic life (6.5 mg/L at the typical pH in the river of 7.6). While this analysis is conducted based on a mass balance, ammonia in surface waters is consumed by plants and algae and is converted to nitrates. Therefore, actual ammonia concentrations in the stream would be lower than these theoretical values and would decrease downstream of the effluent outfalls. The relationship is also described in **Appendix E** where output from the Qual2K model demonstrates a marked decrease in ammonia concentrations downstream of the outfalls.

Due to increased effluent volumes relative to those currently treated by the IWWTF, the total annual BOD loads discharged to the Whitemud River from the IWWTF will actually increase by a maximum of approximately 50%, but this increase is expected to be more than offset by the additional treatment of the municipal effluent in the municipal lagoons, as an overall reduction of 33% is expected in the total annual BOD loads in the combined effluents (**Table 6.3**). During the May-October period in which discharge currently occurs, the rate of BOD loading to the river in the industrial effluent will be reduced by 80%. The discharge of industrial effluent during the winter, which does not occur now, will add a load of approximately 8 kg/day of BOD to the background load in the river of approximately 19 kg/day.

As discussed in **Section 2.6**, dissolved oxygen concentrations at locations throughout the Whitemud River are occasionally below the Manitoba Surface Water Quality Objectives for protection of aquatic life during the open-water season, due in part to BOD concentrations in the river. The anticipated moderation in BOD loading in the industrial effluent, together with reduced BOD concentrations in the municipal effluent, are expected to improve dissolved oxygen concentrations to some extent in the Whitemud River, as overall BOD loads in the Whitemud River downstream of the effluent outfalls are expected to be reduced by 21% during the open-water season and by 9% over the year (**Table 6.3**).

Similar to BOD, annual total nitrogen loads in the industrial effluent are expected to increase by 8% due to the relative increase in IWWTF effluent volume, but this increase will be more than compensated for by reductions in loading from the municipal effluent, as combined total nitrogen loads in the municipal and industrial effluents will be reduced by 7% over the year (**Table 6.3**). Total annual phosphorus loads are expected to be reduced by 82% in the industrial effluent and 51% in the combined effluents as a result of the project.

As discussed in **Section 2.6**, industrial and municipal effluent discharges at the Town of Neepawa contribute to elevated nutrient concentrations in the Whitemud River between the Towns of Neepawa and Gladstone, and ultimately to nutrient loading to Lake Manitoba. The proposed alterations will result in overall reductions in annual total nitrogen and phosphorus loads in the Whitemud River downstream of the Town of Neepawa by at least 3% and 32%, respectively (**Table 6.3**).

Over the open-water season, the proposed project is expected to reduce the total discharge of nitrogen and phosphorus in the Neepawa effluents by 29% and 56% respectively, which will result in decreases of 23% of total nitrogen and 52% of total phosphorus in the river downstream of the discharge points. As described in **Section 2.6**, the Whitemud River downstream of nutrient inputs at the Town of Neepawa is highly eutrophic (excessively productive), but uptake by plants during the growing season appears to reduce nitrogen to near background concentrations between the Towns of Neepawa and Gladstone. The nutrient reductions resulting from the project may improve aquatic habitat in the river by moderating the eutrophic conditions and may result in a reduction of phosphorus to growth-limiting concentrations (near the Manitoba Water Quality Guideline) upstream of the Town of Gladstone.

Overall the proposed upgraded IWWTF and additional treatment provided at the Municipal Cell #3 for municipal wastewater will result in negligible negative impacts during winter months to water quality in the Whitemud River on a local to regional scale. During summer months, the proposed improvements will result in moderate positive improvements to surface water on a local to regional scale in the Whitemud River in terms of nutrients. The improvements will result in a negligible positive improvement in water quality in Lake Manitoba. These impacts are anticipated to occur over the long term on a continuous basis.

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Table 6.2 : Existing and Projected (Post-Project) Concentrations Of BOD, Organic Carbon, Suspended Solids and Nutrients in the Town Of Neepewa Municipal and Industrial Wastewater Effluents and the Whitemud River Upstream of the Effluent Outfalls

		Current Operation		Projected Operation			Whitemud River Upstream of Discharges [3]	
		Municipal [1]	Industrial [2]	Municipal	Industrial (Maximum)	Industrial (Anticipated)	May-October	November-April
Discharge Frequency		4 times/year, 2 weeks each, May-October	2 times/year, 4 weeks each, May-October	16 weeks total, May-October	24 / 7 / 365	24 / 7 / 365	-	-
BOD_5	**mg/L**	27	8	15	-	-	3.2	2.0
$CBOD_5$	**mg/L**	23	11	15	30	5	-	-
TSS	**mg/L**	29	36	29	30	5	9.1	7.5
DOC	**mg/L**	19	25	10	-	-	-	-
TOC	**mg/L**	38	31	25	-	-	-	-
NH_3/NH_4	**mg/L**	25	28	20	-	1	0.1	0.8
NO_3/NO_2	**mg/L N**	0	4	0	-	-	0.1	0.3
TKN	**mg/L**	26	30	22	-	-	1.2	1.8
TN	**mg/L**	26	34	22	15	15	1.3	2.1
P	**mg/L**	5	15	4	1	1	0.1	0.1

1. Data obtained from single sample collected from Municipal Cell #2 on May 13 2008, prior to discharge.
2. Average values, 2004-2007, calculated as means of data reported to Manitoba Conservation as per Emergency Discharge Orders, except CBOD, DOC, TOC data obtained from single sample collected from Municipal Cell #3 on May 13 2008; TP concentration estimated as 20 mg/L for summer discharge periods, measured 2008 concentration (9.07 mg/L) for effluents discharged in spring or fall.
3. Averages of monthly data, 1990-1991. No data for November or December 1991.

Table 6.3: Existing and Projected (Post-Project) Loading Rates Of BOD, Ammonia, Nitrogen and Phosphorus in the Town of Neepawa Municipal and Industrial Wastewater Effluents and the Whitemud River

	EXISTING			ANTICIPATED			Whitemud River Upstream of Discharges[3]	% OF EXISTING LOADS [4]			
	Municipal Effluent [1]	Industrial Effluent [2]	Total Effluents	Municipal Effluent	Industrial Effluent	Total Effluents		Municipal Effluent	Industrial Effluent	Total Effluents	River Downstream of Neepawa
MAY-OCTOBER (During periods of discharge) (kg/day)										**May-October Average (kg/day)**	
BOD	241	40	NA	67	8	75	92	28 %	20 %	57 %	79 %
NH_3/NH_4	219	140	NA	89	2	91	2	41 %	1 %	55 %	56 %
TN	235	166	NA	98	23	121	32	42 %	14 %	71 %	77 %
TP	43	66	NA	19	2	21	2	45 %	3 %	44 %	48 %
YEARLY TOTAL (kg/year)											
BOD	13 500	1849	15 349	7 500	2774	10 274	40 368	56 %	150 %	67 %	91 %
NH_3/NH_4	12 250	6517	18 767	10 000	555	10 555	4 484	82 %	9 %	56 %	65 %
TN	13 153	7725	20 878	11 003	8322	19 325	24 510	84 %	108 %	93 %	97 %
TP	2 410	3084	5 494	2 150	555	2 705	3 157	89 %	18 %	49 %	68 %

NA Municipal and Industrial effluents (from Municipal Cell 2 and Municipal Cell 3, respectively,) are not discharged simultaneously (pers. comm. Town of Neepawa)

1. Concentration data obtained from a single sample collected May 13 2008, prior to discharge. Flow data based on estimate provided by the Town of Neepawa.
2. Average, 2004-2007, calculated from data reported to Manitoba Conservation; TP concentration estimated at 20 mg/L for summer samples, measured 2008 concentration (9.07 mg/L) for effluents discharged in spring or fall.
3. Average, 1990-1991, based on flow-weighted means of monthly data for Boggy Creek and Stony Creek, with correction of flows for Franklin Creek drainage. No data for November and December 1991.
4. Relative magnitude of anticipated loads, expressed as percentage of existing loads.

Biosolids Application Impacts

Biosolids will be applied to land on an annual basis as part of an annual application program which will be conducted following Environment Act Licence requirements. If biosolids are applied at inappropriate rates or to inappropriate sites, impacts to surface water can occur due to runoff from application sites. It is anticipated that the Environment Act Licence requirements would include standard requirements with respect to avoiding drains, water courses, etc during the application program. Further, qualified applicators will be retained to complete the annual program. As a result, the biosolids land application program will result in negligible impacts to surface water resources. Surface water impacts have the potential to be negative, of short term duration, locally occurring on a rare basis.

6.5 SOIL IMPACTS

6.5.1 Construction Phase

Fuel and Chemical Spills

During the construction phase, there is the potential for soil contamination through spills in the refueling area or chemical storage areas and the possibility of mechanical breakdown of construction or yard equipment which may result in liquid releases. It is proposed that if a spill were to occur, containment would occur as soon as possible followed by timely remediation. Potential spills could result in minor negative impacts to soil resources. Impacts would have a local scope of influence and would likely occur on a rare basis. Depending on the material released to the environment during a spill, impacts could occur over the short to moderate term.

Erosion

During the construction phase, there is potential for erosion, due to the disturbance of soils associated with the construction activities as well as retained soil stockpiles. The construction process will require the disturbance of approximately 1 ha of soil for the installation of the new road, process buildings and aboveground tanks. However, construction will be completed in stages to reduce the amount of site disturbance. Gravel and salvaged topsoil will be temporarily stockpiled at the site for use in the construction and re-vegetation process. Erosive action on these stockpiles and disturbed areas due to heavy precipitation and winds can result in the loss of soil resources and potential subsequent impacts to surface water and aquatic resources. Erosion impacts to soils during the construction phase are anticipated to be negative, negligible to minor in magnitude and to occur intermittently over the short term on a local scale.

6.5.2 Operational Phase

Fuel, Chemical and Biosolids Spills

During the operational phase of the project, there is potential for fuel, chemical and biosolids spills as indicated in **Section 6.3.2.** Spills have the potential to contaminate soils over a local scope of influence on a rare basis. In the event of a spill, containment and remediation measures would be conducted as soon as possible. Secondary containment for chemicals will be provided where required, biosolids will be applied to sites by qualified applicators and limited quantities of fuel will be used on the site, resulting in negligible potential impacts to soils. Depending on the material released to the environment during a spill, impacts could occur over the short to moderate term.

Erosion

During the operational phase, there is potential for erosive action on soils at the effluent discharge location. Erosive action can result in soil loss and potential subsequent impacts to surface water and aquatic resources. To prevent erosive action due to the effluent outfall, riprap will be placed at the outfall location. With the riprap in place, erosion impacts at the outfall during the operational phase are anticipated to be negligible. Erosive impacts have the potential to be of short term duration occurring on a local scale intermittently.

Biosolids Application Impacts

Biosolids will be applied to land as part of an annual application program which will be conducted following the Nutrient Management Regulation and any additional Environment Act Licence requirements. Over-application of biosolids can result in a build up of metals in soils. Biosolids application can also provide positive impacts to soil by providing organic matter and nutrients. It is anticipated that the proposed facility’s Environment Act Licence will include limits on the maximum concentration of parameters (such as metals) in soils after application to prevent negative soil impacts. Further, testing of application sites and biosolids will be completed prior to application to ensure nutrients and metals are not over applied to sites. Application plans will be filed on an annual basis.

The biosolids land application program will require an estimated 157 ha/year of agricultural land for biosolids application. As detailed in **Appendix K**, approximately 74,386 ha of suitable land is available within a 30 km radius from the proposed IWWTF site which can provide 473 years of land without having to re-apply to the same sites.

As a result, the biosolids land application program is expected to result in negligible negative impacts and overall positive impacts to soil resources. Negative soil impacts have the potential to be of short term duration, locally occurring on a rare basis. Positive soil impacts will occur on an intermittent basis.

6.6 TERRESTRIAL IMPACTS

6.6.1 Flora Impacts Construction Phase

Species Loss

During the construction phase of the proposed project, there is potential for flora species loss due to ground disturbance, soil compaction from heavy equipment use and clearing and grubbing activities (if required). Further, species may be lost due to accidental spills of fuel or chemicals.

Soil compaction from construction machinery, clearing and grubbing and the general disturbance of the site will potentially negatively impact vegetation in the immediate area of the construction activities. It is anticipated that approximately 1 ha of vegetation will be lost due to the construction of the new road, process buildings and aboveground tanks. Additional lands will also be disturbed during the construction process due to equipment movements and may result in additional areas of species loss. Some flora species will also be lost due to the placement of riprap at the effluent outfall location. As indicated in **Section 2.10**, all of the plants recorded in the proposed project area are doing well in the general Neepawa area and, although any loss of habitat has negative local implications, none of the species in the project area are deemed "rare and/or endangered" by provincial and federal governmental officials. Consequently, the development of an IWWTF in this location does not raise any specific environmental concerns regarding plants. Therefore, the potential impact due to flora species loss from construction activities and potential accidental spill of fuel or chemicals is considered negligible. Loss of flora will be a negative local impact and will occur once over the long term of the life of the facility. Impacts to flora due to chemical or fuel spills are anticipated to occur on a rare basis.

Dust Deposition

During construction there are potential impacts to flora due to dust deposition. Construction and decommissioning activities have the potential to generate fugitive dust emissions. Unmitigated impacts to flora due to airborne dust and particulates will be negative and negligible in magnitude, occurring intermittently over the short term on a local scale.

6.6.2 Flora Impacts Operational Phase

Dust Deposition

There is potential for airborne dust and particulate generation during the operational phase of the project due to traffic on site gravel roads. Airborne dust and particulate emissions can create negative impacts to flora due to dust deposition. The 3.5% increase in traffic during the annual biosolids program (see **Section 6.8**) will be moderate in magnitude, with the traffic increase over the remainder of the year being negligible in magnitude. During the biosolids application program, water or another suitable alternative will be applied to gravel roads as required to prevent dust generation where activities take place in close proximity to residential properties.

Airborne dust and particulate impacts have the potential to create negative, minor to negligible impacts during the biosolids application program and negligible impacts over the remainder of the year, occurring intermittently over the short term.

6.6.3 Fauna Impacts Construction Phase

Habitat Loss

During the construction phase of the proposed project, there is potential for fauna habitat loss due to ground disturbance, soil compaction from heavy equipment use and clearing and grubbing activities (if required). Further, habitat may be affected due to accidental spills of fuel or chemicals. As indicated previously, it is estimated that approximately 1 ha of habitat typical of formerly cultivated land will be lost due to the construction of the new road, process buildings and aboveground tanks. As indicated in **Section 2.10**, there are several places in the general vicinity of the proposed IWWTF site which have a far greater value for local wildlife than the proposed site. Therefore the loss of this habitat is considered a negligible impact. This impact is considered to be local and will occur once, lasting the life of the facility in areas of permanent structures. Impacts to habitat due to chemical or fuel spills are anticipated to occur on a rare basis.

Disturbance due to Noise

Construction related noise impacts to wildlife are expected to be limited. Most wildlife species already present in the area surrounding the plant have likely adjusted to the ambient noise and activity disturbances of the area. The construction disturbances themselves are expected to be limited to the local area. Further, as pile driving not likely required, limited construction noise emissions are anticipated. Potential negative disturbances to wildlife due to construction noise are anticipated to be negligible in magnitude occurring intermittently over the short term.

6.6.4 Fauna Impacts Operational Phase

Habitat Fragmentation/Alienation

The permanent loss of 1 ha habitat due to the construction and operation of the proposed facility is anticipated to have a negligible impact to fauna in terms of habitat fragmentation and alienation. The proposed site is not considered a valuable source of habitat as there are several other locations in the vicinity of the proposed site with a higher value to wildlife. Further, the proposed IWWTF has quite a small footprint (approximately 1 ha including access roads) that generally avoids significant tracts of undisturbed land, such as the wooded area east of the existing IWWTF, therefore limiting the amount of fragmentation and alienation caused by the development. The proposed development will cause negative negligible impacts to local fauna in terms of habitat fragmentation and alienation over the long term on a continuous basis.

Disturbance due to Noise

Noise impacts may occur during the IWWTF operation due to the use of pumps and blowers and the backup generator as well as noise due to vehicles arriving/departing the IWWTF site.

As indicated previously, noise impacts due to the backup generator, the pumps and blowers and the increase in traffic due to material deliveries and screenings disposal traffic are anticipated to be negligible in magnitude resulting in negligible disturbances to fauna.

The increase in traffic during the annual biosolids land application program is anticipated to increase daily traffic in the local area by approximately 3.5% as detailed in **Section 6.8**. During the application program, there will likely be less than ten vehicles at the site at one time. Further, vehicle idling will be kept to a minimum to reduce noise emissions. As biosolids application will occur during the fall, when there is increased activity in the local area and region due to harvesting etc., it is assumed that this increase in traffic is anticipated to create negligible to minor noise impacts to fauna in the local area. This increase is anticipated to occur over the short term of the biosolids application program. The minor increase in noise emissions is anticipated to produce intermittently occurring noise impacts, however, when compared to the AADT of 3,260 vehicles per day on PTH 16 to the south of the proposed IWWTF, the additional noise due to truck traffic is not anticipated to have more than negligible effects on local fauna.

6.7 HUMAN HEALTH RISK

6.7.1 Worker Health and Safety

Construction workers at the IWWTF will be trained and will follow appropriate workplace health and safety procedures and protocols as required of all construction workers in accordance with the Manitoba Workplace Safety and Health Act.

On all construction sites, the presence of heavy equipment, excavations, and machinery; and, other circumstances provide the opportunity for minor, severe; and, possibly fatal injuries. In Manitoba, worker protection is provided through legislated standards, procedures; and, training under the Workplace Safety and Health Act. All construction practices undertaken on the site will be carried out in accordance with the Workplace Safety and Health Act to minimize health and safety impacts.

During facility operation, employees will receive appropriate training on the use of chemicals used in the IWWTF operation. Where appropriate, the Town of Neepawa will provide personal protective equipment to workers. All work conducted at the IWWTF site when the facility is in operation will be conducted in accordance with the Manitoba Workplace Safety and Health Act.

It is anticipated that there will be a negligible increase in factors contributing to worker health and safety impacts. If impacts were to occur depending on the severity of the incident, the magnitude could be negligible to major. Impacts are anticipated to be of short to long term duration rarely occurring on a local basis.

6.7.2 IWWTF Outputs

Transfer of Pathogens from IWWTF Outputs

There is potential for pathogen transfer to human receptors from IWWTF process outputs including treated effluent, biosolids, chlorinated permeate and during the cascade aeration process.

The proposed facility has been designed to meet the anticipated Environment Act Licence effluent limits of <200/100 mL (based on a 30 day geometric mean for fecal coliform bacteria and *Escherichia coli*.) including UV disinfection prior to discharge. As these limits are prescribed by Manitoba Conservation, and health risks are considered during their development, the impact to human health due to pathogen transfer from treated effluent is anticipated to be negligible.

Biosolids will be aerated while the sludge cell is in the fill cycle. After the fill cycle, the biosolids will be stabilized for approximately a one year period prior to their application to land. Biosolids will be applied to land by shallow injection, limiting the amount of biosolids exposed for potential contact/ingestion. Further, the land application program will stipulate the allowable crop types grown on the application site for a period following application, reducing the potential for any direct transfer of pathogens to the food chain. The associated health risk due to the transfer of pathogens from biosolids is therefore anticipated to be negligible.

Membrane permeate will be reused as non-potable utility water at the IWWTF as well as in the Springhill Farms pork processing facility truck wash. The permeate will undergo UV disinfection and will also be chlorinated in an on-site chlorination unit prior to its use. These measures are expected to provide adequate treatment of the water for non-potable utility water use. The risk of pathogen transfer is anticipated to be negligible with the use of the chlorinated permeate in this manner.

Mechanical aeration systems have the potential to aerosolize and release pathogens from the water that is aerated depending upon the process employed. In this case, the water to be aerated is the effluent that has been treated in the IWWTF via activated sludge, membrane filtration and UV disinfection processes. Since the aeration/cooling process selected (cascade aerator) will minimize the amount of wastewater aerosolized and the wastewater has undergone this tertiary level of treatment, the resulting potential impact of pathogen transfer is considered negligible.

Health impacts due to pathogen transfer from IWWTF outputs have the potential to be of short to long term duration, rarely occurring on a local basis.

6.7.3 Decommissioned Infrastructure

It is proposed that the existing anaerobic cell, anoxic basin and aeration cells #1 and #2 be decommissioned as part of the proposed project. Each of these cells will be maintained with a water cap for at least one year to ensure sufficient stabilization. After that hold time, the cells will be dewatered and the sludge will be removed and applied to land. At this time, the Town plans to allow the cell berms to be left in-place.

Trespassing on the existing IWWTF site in the area of these cells could result in personal injury. To restrict public access to the site, a fence, currently installed around the perimeter of the existing IWWTF, will be maintained and remain around the existing IWWTF. With barriers to restrict access to the site, the associated health risk is anticipated to be negligible.

Health impacts due to decommissioned infrastructure have the potential to be of short to long term duration, rarely occurring on a local basis.

6.8 TRANSPORTATION IMPACTS

6.8.1 Construction Phase

Vehicle Congestion

During the construction phase of the project, incoming site traffic will include trucked raw material shipments (i.e., gravel, concrete, steel, equipment, etc.) as well as construction equipment and worker transportation. Some traffic will also arise during the removal and land application of biosolids from the existing aeration cell #3 and during the decommissioning of the existing anaerobic cell and aeration cells #1 and #2. Lighter traffic will include contractor and sub-contractor vehicles. It is estimated that there will be 30 vehicles or less at any one time at the site during the construction process, including worker vehicles and heavy equipment. The 30 vehicle increase will result in a minor increase in vehicles in the local area based on an AADT of 3,260 on PTH 16 east of PTH 5.

Existing roads and highways are expected to be used during the plant construction with the exception of a new access road that will be constructed from Neepawa Road, east into the proposed IWWTF site and to the new sludge cells. The traffic increase during the construction phase of the proposed project is anticipated to be minor. As a result, vehicle congestion impacts are anticipated to be negative but minor and intermittent while affecting a local area over the short term without any additional mitigation measures.

Vehicle Collisions

With the minor increase in vehicles in the area during the construction period, there is a potential for vehicle collisions to increase. The anticipated minor increase in vehicles will likely result in a negligible increase in the risk of vehicle collisions. Unmitigated impacts are anticipated to be negative but occurring rarely over the short term in the local area. Overall factors leading to increased vehicle collisions is anticipated to be negligible.

6.8.2 Operational Phase

Vehicle Congestion

During the operational phase of the project, incoming site traffic will include chemical delivery traffic, screenings disposal traffic as well as employee traffic and traffic associated with the annual biosolids application program.

Between chemical delivery traffic and screenings disposal traffic, approximately two large trucks per week will travel to the IWWTF. Based on the AADT of 3,260 on PTH 16 east of PTH 5, the additional two trucks per week for chemical delivery and screenings disposal will account for a negligible increase in truck traffic in the area and a resulting negligible vehicle congestion impact.

Employee traffic to the site is estimated to be a maximum of three vehicles per day or six trips to/from the site on a daily basis. The employee traffic is negligible compared to the existing AADT of 3,260 on PTH 16 east of PTH 5.

Biosolids generated at the proposed IWWTF will be land applied on an annual basis as part of a biosolids management program. During the application period, trucks will be used to transport the biosolids from the sludge cells to the various suitable application sites with trucks entering the IWWTF site from Neepawa Road. It is estimated that approximately 500 truck loads over a one to two week period will be required. It is estimated that approximately 57 truck loads per day (one way trips) will enter the IWWTF site during the application period. Based on the AADT of 3,260 on PTH 16 east of PTH 5, the 57 truck loads per day or 114 trips to and from the site will account for a 3.5% increase in traffic in the area, representing a moderate increase. This moderate increase in traffic in the area can also create a moderate negative impact to vehicle congestion during the biosolids application program. These impacts are likely to occur intermittently over the short term on a local scale.

Vehicle Collisions

The moderate increase in vehicles in the local area during the biosolids application program can also increase the factors contributing to vehicle collisions and accidents including wildlife collisions. Licenced applicators will be retained to conduct the application program, providing a reduction in the potential for vehicle collisions. Further, signage will be used to warn other drivers of the activity and reduce the potential for accidents with application equipment. The impact associated with vehicle collisions is anticipated to be minor, occurring rarely over the short to long term on a local scale. In the event of a serious injury or loss of life due to collisions, the impact may be considered moderate to major in magnitude.

Damage to Infrastructure

During the biosolids application activities, there is potential for damage to local infrastructure. Traffic on gravel roads such as those in agricultural areas can cause potholes and rutting under inclement conditions. The 500 trucks per year required to apply the biosolids to agricultural land could create a minor to moderate negative impact to infrastructure. This impact would occur intermittently over the short term on a local to regional scale.

6.9 HERITAGE RESOURCES IMPACTS

6.9.1 Construction Phase

There is potential for impacts to heritage resources, including but not limited to, artifacts, First Nations, and historical features or skeletal remains encountered as a result of construction activities. Ground disturbance and excavation has the potential to damage potentially present heritage resources. The proposed site for the IWWTF includes previously cultivated farmland and therefore there is little potential that development of the IWWTF on the property will damage any heritage resources on the site. According to the Heritage Resources Branch, the potential to impact significant heritage resources is low. A copy of the correspondence from Heritage Resources Branch is included in **Appendix H**.

Potential impacts to heritage resources during construction are anticipated to be negligible, negative, long term and occurring once on the site.

6.9.2 Operational Phase

During the operational phase of the proposed project, no additional notable ground disturbance will occur. As a result, potential impacts to heritage resources during the operational phase of the project are not anticipated.

6.10 IMPACTS ON LOCAL LAND USE PLANNING PROGRAM

The current zoning of the proposed IWWTF site and the existing IWWTF site is MH – Industrial Heavy Zone. Under this designation, wastewater treatment facilities are permitted on a conditional basis. As the proposed IWWTF site is located immediately adjacent to the existing IWWTF site, no significant impacts on the local land use planning program are anticipated as this land has been in use for this purpose since the late 1980s. Further, the land transfer process for the proposed IWWTF site was also supported by the Town of Neepawa council.

Overall, the impact of the construction and/or operation of the IWWTF on the local land use planning program will be negligible. Potential impacts on land-use planning could be negative, neutral or positive, occurring continuously over the long term on a local to regional scale.

Section 7.0
Mitigative Measures

SECTION 7.0
MITIGATIVE MEASURES

The mitigative measures described in this section have been formulated to directly address the potential impacts that were identified previously in **Section 6.0**. This section follows the general organization of **Section 6.0** by presenting proposed mitigation measures which correspond to each potential impact. Where impacts in **Section 6.0** were negligible in magnitude, no mitigative measures are proposed as the impact is considered to be sufficiently mitigated.

Table 7.1, presented at the end of this section, identifies the proposed method of mitigation presented in **Sections 6.0** and **7.0** as well as its anticipated effectiveness by assigning a degree of reversibility to each impact. Each impact that is classified as reversible, means that the proposed mitigation can successfully restore the environment or resource within ten years, and irreversible, means that the proposed mitigation will likely not be able to restore the environment or resource within ten years. A residual impact category is also shown which describes the remaining impacts following implementation of the mitigation measures.

7.1 AIR QUALITY IMPACT MITIGATION

7.1.1 Exhaust Emissions

Impacts to air quality due to exhaust emissions during construction and activities as well as during the proposed IWWTF operation will be mitigated by ensuring that vehicles and equipment/machinery are properly maintained. Further, vehicle and equipment/machinery idling will be kept to a minimum to reduce emissions. The air quality impacts due to exhaust emissions are considered reversible. The residual impact to air quality due to emissions during the construction phase with the proposed mitigation measures in place will likely be exhaust emissions typical of construction sites and is considered negligible off-site and potentially minor on-site. During operation, the residual impact due to exhaust emissions is anticipated to be negligible.

7.1.2 Airborne Dust and Particulates

Impacts due to dust generation will be mitigated by employing dust suppression activities as required during construction activities as well as during facility operation. These activities may include but are not limited to; application of water or chemicals to roadways, imposing site speed limits and covering material stockpiles. Further, during construction, the amount of disturbed area will be minimized as much as practical to reduce the disturbed area available for dust generation. Re-vegetation (either through natural succession or direct application) will occur as soon as practical once construction activities are complete to reduce the potential for dust generation. Impacts due to dust generation are considered reversible. With these mitigation methods employed as necessary, the residual impacts of dust generation on air quality and subsequent impacts to human health and flora are expected to be negligible in both the construction and operation phases of the proposed project.

7.1.3 Odours

Odour impacts during the construction phase of the project are anticipated to be at least partially mitigated by dispersion provided in the buffer zone between the existing and proposed IWWTF location and the nearest residential receptor. Further, vegetation surrounding the existing IWWTF and the residential receptor will assist in the disbursement of odours generated during the de-sludging of the cells to be retrofitted and decommissioned. If during the initial stages of the de-sludging process it is determined that significant odour generation may be possible, the Town of Neepawa will notify nearby residents of the timing of odour generating activities. Odour impacts during the construction phase of the project are considered to be reversible and with the proposed mitigation measures in place are likely to have a negligible impact on those near the site.

If odour complaints are received by Manitoba Conservation or the Town of Neepawa during the operational phase of the project, the Town of Neepawa will mitigate appropriately as issue arise though none are anticipated. Odour impacts are considered reversible. With the proposed mitigation measures in place, the residual odour impact during the operation phase is anticipated to be negligible.

7.1.4 Greenhouse Gas Emissions

To mitigate potential greenhouse gas emissions during the construction phase of the project, vehicles are to be well maintained. In addition, when equipment will not be immediately used it will be turned off to reduce emissions. An exception to this will be during equipment warm up where equipment will run idle until it reaches suitable working temperatures. Impacts due to greenhouse gas emissions are considered irreversible. Residual impacts are anticipated to be typical greenhouse gas emissions associated with vehicles and construction equipment/machinery exhaust and are likely negligible in magnitude.

During the operation stage of the proposed IWWTF, there will be a major facility level and negligible Provincial level reduction in greenhouse gas emissions compared to the current emissions associated with the existing IWWTF. No mitigation measures are proposed, however the Town of Neepawa will keep abreast of developments in technology in the area of greenhouse gases and will consider additional reduction strategies where possible and appropriate. The residual impact is anticipated to be negligible during operation.

7.1.5 Noise Emissions

Noise generated as a result of the construction process and related equipment is anticipated to be sporadic with relatively minor to negligible levels of unmitigated noise. Noise from back-up "beepers" will not be mitigated as it is considered to be a safety requirement. However, other vehicle and equipment noise will be addressed by maintaining the equipment in good working order and operating the equipment only during appropriate hours. General noise impacts are considered reversible (with the exception of personal level exposures to high noise levels, which are not anticipated to occur beyond site boundaries). After mitigation, the noises produced by the construction vehicles and equipment are anticipated to present only negligible annoyances for nearby residents and due to the relative distance to the nearest populated area, the impact is considered negligible. In addition, point sources of high-intensity noise can be mitigated through the use of temporary barriers if complaints are received.

To mitigate potential noise impacts during the biosolids land application program, traffic to and from the site will be permitted during appropriate hours only. Vehicles used during the application program are to be well maintained. If required, speed limits will be imposed to further reduce noise emissions due to acceleration and braking. With the described mitigation measures in place, the residual impacts are anticipated to include minor to negligible noise impacts during the biosolids application program depending on proximity of application equipment to the noise receptors.

7.2 GROUNDWATER IMPACT MITIGATION

7.2.1 Fuel, Chemical and Biosolids Spills

During all phases of the proposed project (but particularly during construction) there is potential for environmental impacts due to fuel and chemical spills. Accidents (including transportation accidents) can result in the accidental release of hazardous materials and/or equipment fluids.

To prevent spills from occurring during project activities, the following procedures will be employed.

- All potentially hazardous products will be stored in a pre-designated, safe and secure product storage area in accordance with applicable legislation.
- Storage sites will be inspected periodically for compliance with the requirements.
- Should refueling be required on-site during construction, refueling areas will be equipped with secondary containment facilities and spill kits. During operation, backup generator refueling will be completed on a concrete pad with spill kits available.
- Service, fueling, and minor repairs of equipment performed on-site are only to be performed by trained personnel.
- Any used oils or other hazardous liquids are to be collected and disposed of according to provincial requirements.
- Vehicles are to be well maintained to minimize leaks. Regular inspections of hydraulic and fuel systems on machinery shall be completed on a routine basis, when detected, leaks are to be repaired.

- Chemical application shall be completed by trained personnel only.
- All on-site staff will be trained in how to deal with spills.

Chemicals required during operation shall be stored at the IWWTF within the proposed buildings in accordance with applicable regulations. Chemicals stored at the IWWTF will only be handled by trained and qualified personnel.

Should a spill occur, measures will be taken immediately with a spill kit or suitable alternative to prevent migration of the spilled material. Recovery measures, as necessary in consultation with the appropriate provincial authorities, will also be implemented. Following initial response, a remediation program would be undertaken if necessary.

If required during construction, a designated refueling area will be constructed. The refueling area will be lined with clay or a suitable material. The refueling area will be constructed by leveling the surface and constructing small berms on three sides, while facilitating surface water drainage on the fourth side. In the event of a significant spill, the fourth side would be quickly bermed to contain the spill in the unlikely event one occurred. If a spill occurs, contaminated soil will be excavated and hauled to an approved land farm or hazardous waste facility, depending on the level of contamination. Lubricants and other petroleum products that will be utilized will also be temporarily stored to the largest extent possible within the area used for refueling or a similarly constructed area. Fuel for construction equipment purposes will not be stored on the site; and, refueling trucks will leave the site or be kept in the designated refueling area when equipment is not in use.

With the proposed mitigation measures in place, the residual impact to groundwater resources is anticipated to be reversible and negligible.

7.2.2 Wastewater Leakage from Sludge Cells, Pipelines and Aboveground Tanks

In addition to the groundwater protection measures described for the IWWTF in **Section 6.3.2**, groundwater monitoring wells will be installed around the perimeter of the site and will be part of a periodic sampling and monitoring program as a measure to indicate the presence of contamination prior to its migration onto or off of the site. The proposed groundwater monitoring program would supplement existing information provided by past groundwater monitoring conducted for the current IWWTF.

If leakages are identified during facility operation or if contamination is identified during the groundwater monitoring program, the Town of Neepawa will investigate the source of the leakage/contamination. The investigation will be conducted with the intent to repair any problems as well as to provide monitoring and investigations to ensure the surrounding land/groundwater has not been contaminated and no risk to human health exists as a result. Impacts to groundwater are anticipated to be reversible.

With the proposed mitigation measures in place, the residual off-site impact to groundwater resources is anticipated to be negligible.

7.2.3 Biosolids Application

Biosolids application will be conducted in accordance with Environment Act Licence requirements. As indicated in **Section 6.3.2**, Nutrient Management Regulation and Environment Act Licence requirements will include provisions to protect groundwater resources, with resulting negligible residual impacts to groundwater. Groundwater impacts are considered reversible.

7.3 SURFACE WATER IMPACT MITIGATION

7.3.1 Fuel, Chemical and Biosolids Spills

To prevent surface water impacts due to fuel, chemical and biosolids spills, mitigation measures as described in **Section 7.2.1** will be undertaken.

Spill kits or other suitable alternatives will be used to prevent spilled material from migrating to surface waters. Surface water impacts are considered to be reversible. The residual impacts following appropriate mitigation are anticipated to be negligible.

7.3.2 Waste Disposal Practices

During construction, the work area will be inspected by the contractor on at least a weekly basis to collect fugitive debris. Waste will be transferred to an appropriate waste disposal facility on a regular basis. Impacts are considered to be reversible. The residual impact of solid waste disposal on surface water is expected to be negligible with the implementation of these mitigation measures.

7.3.3 Sediment and Turbidity

Potential surface water impacts due to soil erosion transport will first be minimized by limiting the disturbed soils only to necessary areas. Further, drainage ditches would likely convey flows approximately 1.8 km (1.1 mi) to a point where the mile roads intersect with the Whitemud River to the northwest of the IWWTF and will allow silt to settle prior to reaching the river. Silt fences or other suitable erosion control structures will be installed at strategic locations around the site to intercept particulates suspended in the storm water runoff. Additional details on erosion mitigation are included in **Section 7.4.2**. Impacts to surface water are considered reversible with residual impacts being negligible in magnitude.

7.3.4 IWWTF Discharge

The proposed upgraded IWWTF will result in an overall improvement in IWWTF effluent quality. As this effluent will no longer be routed through the Municipal Lagoon Cell #3 prior to discharge to the river, the treatment capacity of the municipal lagoon system will also be restored. Accordingly, municipal wastewater will undergo degredation over a longer retention time with the availability of Municipal Cell #3, thereby resulting in additional improvements to river water quality.

No further mitigation measures are proposed, as the project will result in negligible negative impacts during winter months, moderate positive impacts during summer months and negligible positive impacts at the Provincial scale.

7.3.5 Biosolids Application

Biosolids application will be conducted in accordance with Environment Act Licence requirements. As indicated in **Section 6.3.2**, Nutrient Management Regulation and Environment Act Licence requirements will include provisions to protect surface water resources, with resulting negligible residual impacts to surface water. Surface water impacts are considered reversible.

7.4 SOIL IMPACT MITIGATION

7.4.1 Fuel, Chemical and Biosolids Spills

To prevent soil impacts due to fuel and chemical spills, mitigation measures as described in **Section 7.2.1** will be undertaken.

Should a spill occur, measures will be taken immediately with a spill kit or suitable alternative to prevent migration of the spilled material. Recovery measures and appropriate notification as necessary with the appropriate provincial authorities will also be implemented. Impacts are considered reversible. Following initial response, a remediation program would be undertaken if necessary resulting in a negligible residual impact.

7.4.2 Erosion

Soil erosion will be minimized during construction activities by employing erosion control techniques. During construction activities, silt fences will be used as required and the disturbed area will also be kept to a minimum to reduce erosion risk. Topsoil will be salvaged from disturbed areas, stored in stockpiles and used for re-vegetation where applicable upon completion of construction activities. Stockpiles will be covered if necessary. Re-vegetation will occur where necessary as soon as practical following ground disturbance activities to minimize erosion. Riprap will be placed at the effluent outfall location to prevent erosion during the operational phase. Impacts are considered reversible. With these mitigation measures in place the residual impact due to erosion is considered to be negligible.

7.4.3 Biosolids Application

Biosolids application will be conducted in accordance with Environment Act Licence requirements. As indicated in **Section 6.3.2**, Nutrient Management Regulation and

Environment Act Licence requirements will include provisions to protect soil resources, with resulting negligible residual impacts to soil. As the biosolids will be applied to agricultural land in accordance with requirements, overall positive impacts to soils due to biosolids application are anticipated. Soil impacts are considered reversible.

7.5 TERRESTRIAL IMPACT MITIGATION

7.5.1 Flora Mitigation Measures

Species Loss

During the construction phase, impacts to flora via species loss will be mitigated by minimizing, as much as possible, the amount of ground disturbance. Further, natural or assisted re-vegetation will occur as soon as disturbed areas have stabilized where practical. To mitigate impacts due to chemical and fuel spills mitigation measures as described in **Section 7.2.1** will be undertaken. Flora species loss impacts are considered irreversible. The residual impact is anticipated to be a negligible loss in flora species.

Dust Deposition

During construction and operation, impacts due to dust will be mitigated by employing dust suppression activities as necessary, as indicated in **Section 7.1.2** and impacts are considered reversible. The residual impact after mitigation is anticipated to be negligible.

7.5.2 Fauna Mitigation Measures

Habitat Loss and Fragmentation/Alienation

To mitigate potential impacts to fauna due to habitat loss, activities will be confined to the project area and re-vegetation will be completed to minimize habitat loss and alienation effects. To mitigate potential habitat loss due to spills, mitigation measures as described in **Section 7.2.1** will be implemented.

While assisted and natural re-vegetation will be used to replace some of the vegetation, some marginal habitat will be temporarily lost. Mobile species are expected to relocate in adjacent habitat (that is generally considered to be of higher value). Species adapted to disturbance may remain in the area or temporarily disperse and return once the construction period ends. No wildlife species of concern were identified during the terrestrial survey. The residual impact of this habitat loss on wildlife is considered to be negligible with impacts being irreversible.

Disturbance Due to Noise

Noise impacts during construction and operation will be mitigated as described in **Section 7.1.5**. Noise impacts are considered reversible. Residual impacts to fauna during construction and operation are anticipated to be negligible as noises encountered would be similar to that already experienced in the area from the operation of the existing IWWTF as well as the nearby pork processing plant and highway.

7.6 HUMAN HEALTH RISK MITIGATION

7.6.1 Worker Health and Safety

On all construction sites, the presence of heavy equipment, excavations, machinery, and other circumstances provide the opportunity for minor, severe, and possibly fatal injuries. In Manitoba, worker protection is provided through legislated standards, procedures and training under the Workplace Safety and Health Act. All construction practices undertaken on the site will be carried out in accordance with the Workplace Safety and Health Act to minimize health and safety impacts. It will be the responsibility of the general or prime contractor to coordinate health and safety aspects of the construction. With the proposed mitigation measures in place impacts are considered negligible. Impacts to human health can be considered reversible to irreversible depending on severity.

7.6.2 IWWTF Outputs

As indicated in **Section 6.7.2**, impacts to human health due to pathogen transfer from IWWTF outputs are considered negligible as appropriate treatment of wastewater and biosolids streams will be completed. Impacts to human health can be considered reversible to irreversible depending on severity.

7.6.3 Decommissioned Infrastructure

Trespassing on the existing IWWTF site in the area of proposed decommissioned infrastructure could result in personal injury. To restrict public access to the site, a fence, currently installed around the perimeter of the existing IWWTF, will be maintained and remain around the existing IWWTF. With barriers to restrict access to the site, the associated health risk is anticipated to be negligible. Impacts to human health can be considered reversible to irreversible depending on severity.

7.7 TRANSPORTATION IMPACT MITIGATION

7.7.1 Vehicle Congestion

Unmitigated impacts due to increased vehicle congestion during the construction and operational phases of the project are anticipated to range from minor to moderate in magnitude, respectively. To mitigate potential traffic congestion impacts, transport to/from the site will be limited to off peak hours with alternative routes used if possible. Impacts due to vehicle congestion are considered reversible. The residual impact of vehicle congestion is anticipated to be negligible during the construction phase. The residual impact of vehicle congestion during the operational phase is anticipated to be some minor local intermittent inconvenience to motorists during the biosolids application program.

7.7.2 Vehicle Collisions

To reduce the potential of increased vehicle collisions during the construction and operation phases of the project, appropriate signage will be erected. Further, if required, site speed limits will be imposed. Depending on the severity of the vehicle collision, impacts can be reversible to irreversible. With the described mitigation measures in place, the residual impact is anticipated to be a negligible increase in factors leading to vehicle accidents.

7.7.3 Damage to Infrastructure

To prevent damage to infrastructure due to increased traffic during the annual biosolids application program in the operational phase, the Town of Neepawa, the Rural Municipality where the biosolids are to be applied and the applicator will work co-operatively to determine the road conditions before and after travel by the applicator. If required, parties will contribute for the repair of the infrastructure. Damage to infrastructure is considered a reversible impact and with the described mitigation measures in place, residual impacts are anticipated to be negligible.

7.8 HERITAGE RESOURCES IMPACT MITIGATION

If archaeological site(s) are encountered during construction, a mitigation strategy will be developed. Options can include avoidance, comprehensive controlled surface collection and/or comprehensive mitigation excavation. The strategy chosen, in consultation with the Town of Neepawa and the Heritage Resources Branch, will reflect the integrity of the archaeological resource, the threat of disruption and the development parameters. Potential impacts to heritage resources can be either reversible (in the case of additional burial or flooding) or irreversible (in the case of physical damage to site integrity).

With the implementation of these mitigation measures, the residual impact to heritage resources is considered negligible.

7.9 LAND USE PLANNING IMPACT MITIGATION

The proposed project is anticipated to have a negligible impact on the use and planning of surrounding property. Should impacts be identified, the Town of Neepawa will work proactively with local area residents and businesses towards an acceptable solution. Impacts are considered reversible. The residual impact is anticipated to be negligible.

Table 7.1: Summary of Environmental Impacts

Classification of Potential Impact	Project Phase	Potential Impact	Magnitude of Impact	Direction of Impact	Duration of Impact	Frequency of Impact	Scope of Impact	Mitigative Measures	Degree of Reversibility	Residual Impact
Air Quality	Construction	Exhaust Emissions	Minor on site and negligible off site	Negative	Short Term	Continuous during working hours	Local	Vehicles/equipment to be well maintained, vehicle idling kept to a minimum	Reversible	Minor on-site and negligible off site emissions
		Airborne dust and particulates	Negligible	Negative	Short Term	Intermittent	Local	Dust suppression activities such as watering roadways and minimizing the amount disturbed area and re-vegetation where possible	Reversible	Negligible airborne dust and particulates
		Odours	Negligible	Negative	Short Term	Intermittent	Local	Buffer zone to local residents, communication with local residents	Reversible	Negligible odour impacts
		Greenhouse gas emissions from construction equipment exhaust	Negligible	Negative	Long Term	Continuous during working hours	Provincial	Vehicles to be well maintained, vehicle idling kept to a minimum	Irreversible	Negligible construction equipment emissions
		Vehicle, heavy equipment and construction noise	Minor to negligible	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained and operated only during appropriate hours	Reversible	Negligible noise impacts
	Operation	Vehicle exhaust emissions	Minor	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained, vehicle idling kept to a minimum	Reversible	Negligible vehicle emissions
		Airborne dust and particulates	Minor on-site, negligible locally	Negative	Short Term	Intermittent	Local	Dust suppression activities such as watering roadways and site speed limits	Reversible	Negligible airborne dust and particulates
		Odours	Negligible to minor	Positive	Short Term	Intermittent	Local	Consideration of alternative odour control methods	Reversible	Negligible
		Greenhouse gas emissions from IWWTF	Negligible	Positive	Long Term	Continuous	Provincial	Consider additional reduction strategies if possible	Irreversible	Negligible, positive reduction in greenhouse gas emissions
		Noise due to trucks during biosolids application	Negligible to minor	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained and operated only during appropriate hours, if required site speed limits to be imposed	Reversible	Negligible
Groundwater	Construction	Fuel and Chemical Spills	Minor to moderate	Negative	Short to Moderate Term	Rare	Local	Bermed, lined refueling area also used for chemical storage if possible, remediation	Reversible	Negligible
	Operation	Fuel, Chemical and Biosolids Spills	Minor	Negative	Short to Moderate Term	Rare	Local	Secondary containment, spill kits, qualified applicators, minimal fuel at site	Reversible	Negligible
		Leakage from Sludge Cells, Pipelines and Aboveground Tanks	Minor	Negative	Short to Moderate Term	Rare	Local	Inspections, testing, groundwater monitoring program	Reversible	Negligible
		Biosolids Application	Negligible	Negative	Short to Moderate Term	Rare	Local	Application in accordance with Environment Act Licence requirements	Reversible	Negligible

Table 7.1: Summary of Environmental Impacts (Continued)

Classification of Potential Impact	Project Phase	Potential Impact	Magnitude of Impact	Direction of Impact	Duration of Impact	Frequency of Impact	Scope of Impact	Mitigative Measures	Degree of Reversibility	Residual Impact
Surface Water	Construction	Fuel and Chemical Spills	Negligible	Negative	Short Term	Rare	Local	Bermed, lined refueling area also used for chemical storage if possible, remediation	Reversible	Negligible
		Waste Disposal Practices	Negligible	Negative	Short Term	Rare	Local	Regular clean-up, wastes stored appropriately and removed from site on a regular basis	Reversible	Negligible
		Sediment and Turbidity	Negligible	Negative	Short Term	Intermittent	Local	Erosion control measures, silt fences if required	Reversible	Negligible
	Operation	Fuel, Chemical and Biosolids Spills	Negligible	Negative	Short to Moderate Term	Rare	Local	Secondary containment, spill kits, qualified applicators, minimal fuel at site	Reversible	Negligible
		IWWTF Discharge Winter Months	Negligible	Negative	Long Term	Continuous	Local to Regional	Upgraded IWWTF to provide improved wastewater treatment	Reversible	Negligible
		IWWTF Discharge Summer Months	Moderate	Positive	Long Term	Continuous	Local to Regional	Upgraded IWWTF to provide improved wastewater treatment	Reversible	Moderate, positive
		IWWTF Discharge	Negligible	Positive	Long Term	Continuous	Provincial	Upgraded IWWTF to provide improved wastewater treatment	Reversible	Negligible, positive
		Biosolids Application Impacts	Negligible	Negative	Short Term	Rare	Local	Application in accordance with Environment Act Licence requirements	Reversible	Negligible
Soil	Construction	Fuel and Chemical Spills	Minor	Negative	Short to Moderate Term	Rare	Local	Bermed, lined refueling area also used for chemical storage if possible, remediation	Reversible	Negligible
		Erosion	Negligible to Minor	Negative	Short Term	Intermittent	Local	Erosion control measures such as minimizing disturbed areas, cover material stockpiles, re-vegetation	Reversible	Negligible
	Operational	Fuel, Chemical and Biosolids Spills	Negligible	Negative	Short to Moderate Term	Rare	Local	Secondary containment, spill kits, qualified applicators, minimal fuel at site	Reversible	Negligible
		Erosion	Negligible	Negative	Short Term	Intermittent	Local	Installation of riprap at outfall location	Reversible	Negligible
		Biosolids Application Impacts	Negligible	Negative	Short Term	Rare	Local	Application in accordance with Environment Act Licence requirements	Reversible	Negligible
Terrestrial - Flora	Construction	Species Loss	Negligible	Negative	Long Term	Once (Rare due to spills)	Local	Minimize disturbed area, natural or assisted re-vegetation	Irreversible	Negligible species loss
		Dust Deposition	Negligible	Negative	Short Term	Intermittent	Local	Dust suppression activities	Reversible	Negligible
	Operation	Dust Deposition	Minor to negligible	Negative	Short Term	Intermittent	Local	Dust suppression activities	Reversible	Negligible

Table 7.1: Summary of Environmental Impacts (Continued)

Classification of Potential Impact	Project Phase	Potential Impact	Magnitude of Impact	Direction of Impact	Duration of Impact	Frequency of Impact	Scope of Impact	Mitigative Measures	Degree of Reversibility	Residual Impact
Terrestrial - Fauna	Construction	Habitat Loss	Negligible	Negative	Long Term	Once (Rare due to spills)	Local	Confine activities to project area, re-vegetation	Irreversible	Negligible
		Disturbance due to Noise	Negligible	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained	Reversible	Negligible noise impacts
	Operation	Habitat Fragmentation/ Alienation	Negligible	Negative	Long Term	Continuous	Local	Re-vegetation	Reversible	Negligible
		Disturbance due to Noise	Negligible	Negative	Short Term	Intermittent	Local	Vehicles to be well maintained, if required site speed limits to be imposed	Reversible	Negligible
Human Health	Construction /Operation	Worker Health and Safety	Negligible to major	Negative	Short to Long Term	Rare	Local	Manitoba Workplace Safety and Health regulations to be followed	Reversible to Irreversible	Negligible
	Operation	IWWTF Outputs	Negligible	Negative	Short to Long Term	Rare	Local	Appropriate treatment of wastewater and biosolids	Reversible to Irreversible	Negligible
		Decommissioned Infrastructure	Negligible	Negative	Short to Long Term	Rare	Local	Restrict site access with fence	Reversible to Irreversible	Negligible
Transportation	Construction	Vehicle Congestion	Minor	Negative	Short term	Intermittent	Local	Limit transport to/from site off peak hours if possible	Reversible	Negligible
		Vehicle Collisions	Negligible	Negative	Short term	Rare	Local	Provide appropriate signage, if required, impose site speed limits	Reversible to Irreversible	Negligible
	Operation	Vehicle Congestion	Moderate	Negative	Short Term	Intermittent	Local	Limit transport to/from site off peak hours if possible	Reversible	Minor, some local inconvenience during the annual biosolids application
		Vehicle Collisions	Minor to major	Negative	Short to Long Term	Rare	Local	Provide appropriate signage, if required, impose site speed limits	Reversible to Irreversible	Negligible
		Damage to Infrastructure	Minor to moderate	Negative	Short Term	Intermittent	Local to Regional	Identify damage and repair as soon as practical	Reversible	Negligible
Heritage Resources Impacts	Construction	Disturbance or demolition of heritage resources	Negligible	Negative	Long Term	Once	Local	Notify appropriate authorities if heritage resources are encountered	Reversible to Irreversible	Negligible
	Operation	Not applicable	-	-	-	-	-	-	-	-
Land Use Planning	Construction /Operation	Facility construction and operation	Negligible	Negative, Neutral or Positive	Long Term	Continuous	Local to Regional	The Town of Neepawa to communicate with local businesses and residents if impacts are identified	Reversible	Negligible

Section 8.0
Contingency Planning

SECTION 8.0
CONTINGENCY PLANNING

The proposed Town of Neepawa IWWTF will have numerous contingency plans in place for fire, emergency response and accidental spills.

This section of the report describes in detail some of the contingency plans that the proposed IWWTF has developed to ensure an appropriate response to unlikely, but potential mishaps.

8.1 MALFUNCTION OF IWWTF PROCESS EQUIPMENT/WASTEWATER TREATMENT FACILITIES

Although not considered emergencies from a public viewpoint, typical IWWTF upsets are generally caused by failure of equipment or of the power source.

To reduce the effect of stoppages due to equipment failure, backup replacement parts will be kept on-site for commonly used equipment. Specifically, all main pumping processes are equipped with one duty and one standby pump. Additional spare pumps will also be stored on-site. Other systems are also equipped with redundancy measures, such as the disinfection system that is equipped with one duty and one standby UV unit and the two MBR tanks are each sized to handle the entire wastewater flow if necessary. The initial treatment stages are also designed with redundancies, such that the system can operate without a working screen and the two stage DAF can be run with only one operational unit until the second is repaired or serviced. Each of the UV disinfection units have been designed to disinfect up to 120% of the design flow, thereby providing 100% backup capacity.

In the event of an upset or malfunction at the Springhill Farms pork processing facility, the attenuation tank can provide equalization of flows and rapid changes in wastewater quality.

In the event of a power failure, the proposed IWWTF will be equipped with a backup diesel generator to power all necessary elements. The generator will be sized to provide power to the flow conveyance equipment (pumps including recycle pumps), initial treatment DAF units, the membrane system (pumps, membrane blowers, compressors, etc), chemical dosing equipment, UV disinfection equipment, the effluent cooling device and the central programmable logic controller. The central programmable logic controller will also be equipped with a battery unit capable of supplying power during the generator start-up period. Vital systems at the proposed IWWTF will have a form of lightening protection as necessary. In the event of a large scale power outage, the Springhill Farms pork processing facility would also lose power, subsequently stopping wastewater production and flow into the IWWTF.

8.2 FIRE

During construction and operation, the Town of Neepawa Volunteer Fire Department should be the first to respond to any fire reported at the proposed site. To counteract small fires, dry extinguisher systems will be provided on-site where necessary.

As per National Fire Protection Agency (NFPA) codes, the building will be constructed according to the combustible load within the area. Specifically, all ventilation and electrical requirements will be designed using NFPA 820 as a guideline. Fire hydrant service at the IWWTF site will rely on the existing 150 mm diameter pipe loop currently installed around the Springhill Farms processing facility. This fire main will be extended if necessary to comply with the Manitoba Fire Code. The Town of Neepawa Water and Sewer Services will charge all of the wet fire protection systems on-site.

8.3 ACCIDENTAL SPILLS OR RELEASES OF DANGEROUS GOODS OR HAZARDOUS WASTES

During construction, spills or releases of wastes and dangerous goods will first be reported immediately to the Site Supervisor. In the case of a spill during operation, it will be reported to the treatment Facility Manager. If any spill is found to be in exceedance of the reportable quantities listed under *The Dangerous Goods Handling and Transportation Act, Environmental Accident Reporting Regulation 439/87*, the Site Supervisor, or Facility Manager, will inform Manitoba Conservation’s Emergency Response Team. During construction the Site Supervisor will also inform Earth Tech (Canada), Inc.’s Environmental Services engineers to initiate and co-ordinate clean-up and monitoring of the spill. If any spill is less than the reportable quantity, the Site Supervisor, Facility Manager, or their delegates as appropriate, will co-ordinate clean-up of the proposed site. During operation, an emergency spill at the IWWTF will likely be responded to by the Town’s Volunteer Fire Department.

During construction, a clay-based or synthetically lined fuelling area will be installed to prevent accidental spills from contaminating large areas and facilitate any required clean-up. To refuel the backup generator while the IWWTF is in operation, a concrete pad will be installed. Spill kits will be located near the fuelling area(s) for easy access.

During operation, secondary containment facilities will be provided for metal salt, polymer and sodium hypochlorite. These facilities will have the capability of storing 110% of the total chemical storage tank volume.

8.4 TRANSPORTATION ACCIDENTS

During construction, road and highway closures may impact the construction schedule. Site access will be provided via a new gravel access road entering the site from the west. This access road will run east from Neepawa Road, which is accessible from the south via Provincial Highway No. 16 and from the north via another gravel mile road. In the event of a road closure of Provincial Highway No. 16, on either the east or west side of the proposed IWWTF site, access will temporarily be available along the small gravel mile roads located throughout the area. In the unlikely event that the mile roads are closed or the west access road is unavailable, site access will likely be available from the new gravel road connecting the existing aeration cell #3 and the north end of the proposed site, with access to this gravel road through the Springhill Farms parking lot off of Provincial Highway No. 16, or the hog truck entrance on the east side of the Springhill Farms facility.

Transportation accidents can also result in the release to the environment of vehicle fluids (such as diesel, oils etc.) and the material the vehicles were transporting (such as biosolids). In the event of a transportation accident resulting in a spill, appropriate remediation measures will be undertaken depending on the nature of the spilled material.

8.5 EXTREME RAINFALL EVENTS

During construction, the disturbed portion of the proposed site will be minimized to the extent possible and silt fences will be installed to minimize erosion and sediment transport due to rainfall events, where possible. After construction is complete, natural re-vegetation will be encouraged and augmented where necessary to facilitate erosion control, once the silt fences are removed.

The site will be designed so that precipitation will drain away from facilities by overland flow generally to the west. Drainage from the new site access road will be directed to a drainage ditch, which will be designed to accommodate a 1 in 100 year storm event.

8.6 FLOODWATERS TRANSPORTING POLLUTANTS

The proposed site does not lie within the flood plain as shown in **Figure 2.7**. As a result, no flooding across the proposed site is anticipated to occur except in the form of overland flooding due to spring thaw and extremely large rainstorm events.

To prevent floodwaters from transporting pollutants during construction, standard construction management practices will be undertaken. Any notable fuel spills will be cleaned up immediately, all heavy equipment will be well maintained to reduce the risk of hydraulic, oil and fuel leaks, all waste materials will be stored properly and dealt with in a timely fashion and there will be no dumping of construction wastes on-site.

To prevent floodwaters from transporting pollutants during operation, process chemicals used at the IWWTF will be stored indoors. However, as indicated previously, the proposed site is not located in a flood plain; therefore flood impacts at the IWWTF site during operation are not anticipated to be significant.

8.7 DROUGHT

In cases of drought, the Whitemud River flow may be reduced causing a reduction of the assimilative capacity of the river and a decrease in the water quality. The Town of Neepawa will keep abreast of long term changes in environmental conditions that may potentially lead to a drought and make adjustments to the IWWTFs operations as necessary and in accordance with its licence requirements. In general, the improved treatment provided by the proposed IWWTF will reduce the impact that would be experienced by the river in the case of reduced flows. Furthermore, short term periods of low flow can be mitigated through increased releases from Lake Irwin.

8.8 EXTENDED DISRUPTION OF THE IWWTF

Depending on the extent of a disruption at the IWWTF, wastewater may still be processed. Even if the screens, one of the unit system pumps, one of the initial treatment DAF units, one of the MBR tanks, or one of the UV units is not repairable, the wastewater system can still treat the wastewater to meet effluent discharge criteria, as most systems have built in redundancy or backup.

Further, at the beginning of the processing week while the attenuation tank is starting to fill, some wastewater can be stored within the tank while repairs etc. are made. If the system is not repaired before the attenuation tank is full, or the attenuation tank equipment is malfunctioning, the influent wastewater flow could be curtailed or arrangements potentially be made (with approval requested from Manitoba Conservation) for the municipal lagoons or a vacant cell from the existing IWWTF or a sludge cell from the existing IWWTF to accommodate untreated/partially treated wastewater on an emergency basis. In the event of an extended disruption of the IWWTF, processing operations at the Springhill Farms pork processing facility would likely need to be curtailed so that the treatment capacity of the IWWTF is not exceeded.

8.9 EXTENDED DISRUPTION OF THE BIOSOLIDS APPLICATION PROGRAM

Biosolids produced during the initial treatment DAFs and during the membrane bioreactor process will be placed into one of two new sludge cells over one year, then be allowed to stabilize for approximately one year, prior to land application. In years of heavy rainfall or flooding, soils may become saturated or the groundwater elevation may rise, making land application of biosolids impractical. The Town of Neepawa will keep abreast of long term changes in environmental conditions and as necessary, look at alternative locations to use or store the stabilized biosolids.

8.10 SLUDGE STORAGE CELL LEAKAGE

A new double HDPE liner system will be installed to provide primary and secondary containment for the sludge cells in addition to the existing clay cell construction already in place in the existing IWWTF aeration cell #3. The liner system will consist of HDPE geocomposite media with single sided non-woven geotextile on the soil side for gas venting, an 80 mil HDPE conductive containment liner plumbed to a monitoring sump, an HDPE geocomposite media to convey seepage flow between the liners and a final primary layer of 80 mil HDPE conductive liner. The sump can be monitored to confirm allowable seepage as necessary during the commissioning and operation of the new cells. If there is excessive seepage from the cell, the Town of Neepawa will investigate the source of the seepage with the intent to repair any problems as well as to provide monitoring and investigations to ensure the surrounding land/groundwater has not been contaminated.

8.11 ABOVEGROUND TANK FAILURE

The aboveground storage tanks will be engineered to provide sufficient capacity for the system and will be constructed on top of concrete pads with appropriate quality control inspections conducted during construction. Furthermore, the tanks will be hydraulically tested prior to operation. Typically after the first year of operation, tanks are inspected for warranty purposes. During operation, regular visual observations on tank condition will be made to identify any potential stresses or indications of failure as part of the ongoing maintenance inspection routine at the IWWTF. To prevent vehicle collisions with tanks, traffic protection concrete bollards will be placed around tanks as appropriate.

As the aboveground tanks are not equipped with secondary containment, in the event of a catastrophic aboveground tank failure, partially treated wastewater would flow to the land drainage system ditches and flow downgradient. The closest point on the Whitemud River is approximately 700 m (2,297 ft) from the IWWTF but drainage ditches would likely convey flows approximately 1.8 km (1.1 mi) to a point where the mile roads intersect with the Whitemud River to the northwest of the IWWTF. In the event of a catastrophic tank failure, appropriate investigation and remediation measures would be undertaken as appropriate.

8.12 PIPELINE FAILURE

To prevent pipeline failure, new pipes will be tested prior to operation to identify any potential leaks. It is proposed that PVC pipes be used which also provide low leak potential.

The existing outfall pipeline which will be re-used is less likely to leak as this line is a gravity pipeline. Further, in the event of a leak of this pipeline any leaks would be of treated effluent therefore minimizing potential environmental impacts.

In the event of a pipeline failure during operation, the location of the failure will be identified, the pipeline will be repaired and appropriate remediation measures will be undertaken.

8.13 ACCIDENT PREVENTION

Worker protection in Manitoba is provided through standards, procedures and training legislated under the *Workplace Safety and Health Act*. All practices performed on the proposed site will be carried out in accordance with the *Workplace Safety and Health Act* to minimize health and safety impacts.

During construction, all workers are expected to follow and be trained in the safety protocols from their company. In the event of a severe accident, the Site Supervisor will phone for an ambulance. The Contractor will be required to report all accidents to Workplace Safety and

Health via the Emergency Response Line (1-800-282-8069 or 1-204-945-0581 after hours) in Winnipeg. Regular safety meetings will be encouraged throughout the construction phase.

Safety equipment and personal protective equipment will either be supplied to the employees or be located throughout the facility, where needed. In the event of an accident, fire, police and ambulance/hospital will be notified as appropriate (911 or 204-476-3328).

Section 9.0
Monitoring

SECTION 9.0
MONITORING

9.1 POINT SOURCE AIR EMISSIONS TESTING

No specific provisions for point source air emission testing are planned. If emissions testing were required, none of the equipment on the site is anticipated to need excessively high stacks that would necessitate sampling platforms. Much of the treatment processes are aerobic or anoxic which will minimize methane-produced odours however, anaerobic conditions will develop during the sludge isolation period in the new sludge storage cells. Methane generation from this source is expected to be minimal as the sludge will undergo stabilization in the form of aeration while the cell is filling. Once the cell enters the isolation period, the COD remaining will be much reduced compared to the amount produced by the existing anaerobic cell, resulting in a reduction in methane emissions. If odour complaints are received by Manitoba Conservation or the Town of Neepawa, the Town of Neepawa will provide appropriate mitigative action.

9.2 BACKGROUND AMBIENT AIR QUALITY TESTING

Ambient air quality testing is not currently available in Neepawa, and the Town of Neepawa does not have plans to test ambient air quality unless required to do so.

9.3 GROUNDWATER

The Town of Neepawa will conduct a groundwater monitoring program on-site during the operation of the proposed upgraded IWWTF in accordance with licence requirements. Initially the monitoring would be anticipated to occur on a regular basis then, if no significant impacts are detected, the monitoring program will be scaled back to a lower monitoring frequency. Monitoring of groundwater would be undertaken around the proposed site to ensure that any potential contaminants could be detected and mitigated prior to migration off the site. The program would be developed through consultation with Manitoba Conservation, if requested, and would likely involve groundwater monitoring well installation at selected up gradient and down gradient locations around the proposed site. There are several existing groundwater monitoring wells around the existing IWWTF. Sampling protocols would vary according to the relative well location and monitoring requirements. The protocols would include both up-gradient and down-gradient monitoring of the groundwater and typically would include: total nitrogen, total phosphorous, pH, sulphates, conductivity, water surface elevation, temperature, etc. Results of the analyses would then be forwarded to Manitoba Conservation as specified in the Environment Act License clauses.

The proposed groundwater monitoring program would supplement existing information provided by past groundwater monitoring conducted for the current IWWTF.

9.4 SURFACE WATER

9.4.1 Whitemud River

As the proposed IWWTF effluent discharge to the Whitemud River will represent an improvement compared to the quality of the current IWWTF effluent and will also enable an improvement in the quality of effluent from the municipal lagoon system, no specific river monitoring program is currently proposed. However, should Manitoba Conservation deem it necessary to require specific monitoring of the Whitemud River, the Town of Neepawa would cooperate with Manitoba Conservation in the development of an appropriate work plan to undertake further study of the Whitemud River as it relates to the IWWTF effluent impacts.

9.4.2 Stormwater runoff

The proposed site will be designed so that precipitation will drain away from the proposed facilities. The use of salt for melting snow and ice should be avoided since salt concentrations can increase in groundwater wherever excess snow from parking areas is stored. There is no intention to monitor stormwater on a regular basis.

9.5 INFLUENT WASTEWATER

Influent flow and quality to the proposed IWWTF will be monitored at the wet well prior to the fine screen at the front of the initial treatment train. Selected parameters will be monitored on a continuous basis such as temperature and flow.

9.6 TREATED EFFLUENT

It is anticipated that the licence and operation of the plant will require the collection of effluent samples on a regular basis via a combination of twenty-four hour composites and grab samples. These samples would likely be analyzed for the following parameters; total suspended solids, COD, total nitrogen, total phosphorus, fecal coliform, *Escherichia coli*., and others. The discharge rates would also be recorded during each monitoring period. Treated effluent flow and quality would be monitored on the outlet side of the UV disinfection units while temperature and dissolved oxygen concentrations would be monitored, immediately following the cooling tower process. Selected parameters will be monitored on a continuous basis.

9.7 BIOSOLIDS MANAGEMENT

Biosolids separated during the treatment processes will be stored in the relined and retrofitted sludge storage cells. The periodic monitoring of seepage, if any, from the primary liner to the sump will be possible to confirm the integrity of the liner system.

In addition, after approximately one year of full isolation, stabilized biosolids will be applied to agricultural land. The characteristics of the biosolids as well as the receiving lands will be monitored as part of the land application process in accordance with Environment Act Licence requirements.

Section 10.0
Decommissioning

SECTION 10.0
DECOMMISSIONING

Decommissioning of the proposed upgraded Town of Neepawa IWWTF is not likely to occur for at least 20 years, and the building and structures might be expected to stay in service for 50 years or more. As the facility ages, the electrical and mechanical systems will likely require upgrades. With such a lifespan expected, and as part of their commitment to environmental stewardship, plans for decommissioning of the proposed facility are presently only in the conceptual stages. Once a date for decommissioning has been established, consultation with the proper authorities will help to develop an official site decommissioning plan. Part of the main focus of the plan will be to ensure the land is restored to its original usable state. Though decommissioning can take place over several years far in the future, it is anticipated that the general steps below will be included within the plan.

- Any unused chemicals and hazardous materials will be removed and transported off the site in accordance with the *Transportation of Dangerous Goods Act* (TDGA). The materials will then be recycled for use at other facilities or disposed of properly
- All wastewater from the flow attenuation tank and other process tanks will be treated prior to discharge. All remaining sludge will be pumped to the sludge storage ponds. The contents of the sludge storage ponds may be land applied in accordance with the biosolids management plan after an isolation period of one year
- Equipment, tanks, basins, and storage containers will be reused at other facilities or disassembled into sections for parts or proper disposal
- All tanks and basins will be disposed of/decommissioned in a manner that is in accordance with provincial guidelines
- The buildings will be disassembled with portions either recycled, sold or properly disposed
- Concrete slabs will be removed with the pieces either recycled or disposed at a landfill
- All below grade holes, will be filled with suitable materials so as to not become a future hazard. The sludge storage ponds will be decommissioned according to provincial requirements.
- The site surface will be graded to maintain natural drainage patterns, but also to allow development of future activities on the site
- Unless deemed inappropriate at the time of decommissioning, the site surface will be covered with topsoil and reseeded to reduce erosion on the site, and to make the site aesthetically pleasing to the public
- Any contaminated materials on-site will undergo mitigation (removed, replaced, remediated) to the satisfaction of provincial environmental officials
- Qualified consultants will conduct an environmental site assessment to report on the state of any remaining contamination
- Upon final decommissioning, a detailed decommissioning report will be provided to provincial environmental officials
- Provincial environmental officials will visit the site and certify that the land has been decommissioned in an environmental and satisfactory way

Section 11.0
Sustainable Development Strategy

SECTION 11.0
SUSTAINABLE DEVELOPMENT STRATEGY

The Town of Neepawa fully supports the principles and guidelines of sustainable development as outlined in the document "Sustainable Development Strategy for Manitoba". The Town of Neepawa recognizes that environmental stewardship, human health and social well-being need to be considered in concert with economic development to be compatible with *The Sustainable Development Act*.

11.1 PRINCIPLES OF SUSTAINABLE DEVELOPMENT

The Town of Neepawa is committed to the seven principles of sustainable development. By supporting these principles Neepawa recognizes that the goals of environmental protection, sustainable human health and social well-being are achievable without conflicting with the goal of economic development. Their commitment to each of the seven principles of sustainable development is outlined below:

11.1.1 Integration of Environmental and Economic Decisions

- Concerns and impacts related to the environment, human health and social well-being of the community will be integrated in all economic decisions, including the evaluation and design of the proposed upgrades to the facility right from the early planning stages
- Economic, human health and social consequences will be adequately taken into account for all environmental and health initiatives

11.1.2 Stewardship

- The Town of Neepawa commits to environmental stewardship, sustainable human health and social well-being for the equal benefit of present and future generations
- Sound environmental, human health and social practices are used in the design, construction and operation of the industrial wastewater treatment facility
- Recognition that in achieving economic goals, environmental stewardship, sustainable human health, and social well-being must be integrated into all aspects of business planning and operation

11.1.3 Shared Responsibility and Understanding

- The Town of Neepawa commits to adhering to all applicable laws, regulations and standards to maintain the economic, physical and social environments that all Manitobans share
- Proper and adequate education and training of employees will be provided in order to adhere to relevant laws, regulations and standards
- Commitment to understand, consider and respect differing economic, social, ethnic, or religious views, values, traditions, and aspirations
- The Town of Neepawa recognizes its responsibility to identify and correct situations that endanger human health, social well-being or safety of the environment

- Commitment to work with regulatory agencies, public officials and community organizations in the spirit of co-operation to further mutual concern for the environment, human health and social well-being

11.1.4 Prevention

- Utilization of industry leading technology and management practices to minimize adverse impacts to the environment, human health, social well-being, and the economy and implement mitigative measures when necessary

11.1.5 Conservation and Enhancement

- Support the use of process end products for secondary uses (e.g. partial use of treated effluent as IWWTF non-potable utility water, use of biosolids as fertilizer for agricultural land)
- Minimize the utilization of non-renewable resources (e.g. use of fat from tricanter to fuel boiler)
- Minimize the use of products and materials that are hazardous
- Re-use existing facilities such as storage ponds, pipelines, lift stations etc. where possible
- Promotion of source reduction, waste minimization and recycling programs such as water recovery as may be feasible
- Avoidance of environmentally sensitive areas to maintain ecological processes and enhance the long-term productive capability, quality and capacity of natural ecosystems
- Work collectively with Springhill Farms L.P. to pursue water conservation strategies within the Springhill Farms facility

11.1.6 Rehabilitation and Reclamation

- Commitment to properly decommission the proposed facility and site far in the future
- Plan to restore damaged environments to beneficial uses

11.1.7 Global Responsibility

- The Town of Neepawa will consider and integrate global economic, ecological and social factors when making local decisions
- Commitment to work with federal, provincial and local regulators to ensure needs of global environments are not compromised

11.2 FUNDAMENTAL GUIDELINES OF SUSTAINABLE DEVELOPMENT

The Town of Neepawa recognizes the importance of water quality in Canada and in the Province of Manitoba and the need to preserve this resource for future generations. They also recognize the importance of maintaining a healthy environment for their citizens. The Town of Neepawa commits to satisfy the six guidelines of sustainable development as outlined below:

11.2.1 Efficient Use of Resources

The Town of Neepawa endorses the integration of environmental, human health and social well-being with economic decision-making to make efficient use of resources. The IWWTF will be designed using energy efficient equipment to conserve resources where possible. Conservation of water resources will be enabled through a water recycling program whereby treated effluent will be partially used for IWWTF non-potable utility water and truck wash water. Efficient use of resources is also demonstrated in the retrofitting and re-use of some existing facilities (e.g. sludge storage ponds, lift station and chlorination building). In addition, biosolids will be used for land application providing a valuable fertilizer source for agricultural lands.

11.2.2 Public Participation

One of the six fundamental values of The Town of Neepawa is service to the people. The Town of Neepawa is aware that the aspirations, needs and views of the communities in the vicinity of the proposed site must be considered and that working cooperatively is the key to a successful operation. The Town of Neepawa is committed to working with the community and will strive to alleviate any concerns they may have.

Public participation has been encouraged throughout the assessment of the facility and it is a vital component of the environmental assessment process. The Town of Neepawa provided a forum for community feedback and public concerns through three Open House events. The Open House information was posted on the Town of Neepawa website, and the public was encouraged to fill out the questionnaires. More detailed information regarding Public Consultation is included in **Section 12**. The Town of Neeapawa is committed to ongoing public communication to assure the community that they will be environmentally and socially responsible.

11.2.3 Access to Information

Neepawa is committed to the environmental assessment process as a way to supply accurate project information to the local community as well as to all interested individuals. The public Open House events have been integral to this process. The materials presented at the Open House events, including copies of the blank questionnaire forms, were posted on the Town of Neepawa website to facilitate a forum for community feedback. As well, upon submission to Manitoba Conservation, the environmental assessment will be deposited with Public Registries to ensure the public is well informed about the project.

11.2.4 Integrated Decision Making and Planning

The Town of Neepawa and their representatives have participated in meetings with Provincial officials and local area residents. Their commitment to an efficient, accountable, detailed planning process which incorporates information gained from these communications reinforces their intention of being a long-term, responsible public organization.

11.2.5 Waste Minimization and Substitution

Waste minimization has been integrated into the design of the proposed upgraded IWWTF. The facility will minimize its effluent and waste streams through recycling programs and source reduction. The treated effluent will be partially recycled as process water in some internal IWWTF processes and as truck wash water to minimize water use. The Town of Neepawa commits to minimize or substitute the use of scarce resources where environmentally sound and economically viable.

11.2.6 Research and Innovation

The Town of Neepawa encourages research and development that may lead to new technology and innovation which will further the economic, environmental, human health, and social well-being of the community.

Section 12.0
Public Participation

SECTION 12.0
PUBLIC PARTICIPATION

12.1 PUBLIC CONSULTATION

Public consultation is an integral part of the environmental assessment process. It provides the opportunity for interested stakeholders to receive information from project planners and, in return, it allows the proponents to gain input about public concerns. Public consultation can also provide an opportunity to actively involve stakeholders in the early stages of a project which, in turn, delivers a sense of transparency in the assessment and planning process.

In the case of the proposed IWWTF, formal public consultation has consisted of three public Open House events. Open House events were scheduled to provide an opportunity for members of the public to learn more about the proposed IWWTF project and to also provide an opportunity for them to express their comments. The purpose of the first Open House was to gather community comments and feedback and to present some preliminary information on the project to the community. At the time of the initial Open House, the environmental assessment of the project was still in its early stages, so the information presented was of a preliminary nature, and not considered to be complete or final. The second Open House concentrated largely on providing more detail on some of the findings of the environmental assessment. Representatives from Earth Tech and the Town of Neepawa were present at both of the Open Houses to answer questions, convey information and collect comments.

The first two Open House events were conducted for an IWWTF with a capacity of 550 m^3/day to meet the current wastewater treatment needs of Springhill Farms. Following Open House 2, Springhill Farms was purchased by Hytek Ltd. who announced that they would like to have the IWWTF designed to accommodate the full licenced capacity of the Springhill Farms pork processing plant (CEC Order 1102), which would require the IWWTF to treat up to 1,520 m^3/day of wastewater. Open House 3 was held to introduce the new owners of Springhill Farms, provide the public with details on the updated design of the larger wastewater treatment facility, provide some of the findings of the environmental assessment and to answer any questions the public may have.

A summary of the Open House events is provided in the following subsections.

12.1.1 Open House #1

On October 18, 2007, the first public Open House was held by Earth Tech and the Town of Neepawa to provide an opportunity to receive and convey information concerning the proposed IWWTF for all interested parties. To inform the public of this event, an advertisement was placed in the Neepawa Banner on September 28 and October 5, 2007. The Open House was also advertised on the Town of Neepawa website. A copy of the advertisement is included in **Appendix M.**

The Open House event was held at the Town of Neepawa Public Library. There were 12 registered attendees who participated in the October 18, 2007 Open House. The public was invited to share and express their comments and concerns regarding the project through discussions with representatives from Earth Tech and the Town of Neepawa and by completing a questionnaire. Questionnaires were provided at a final station where the attendees could sit and fill out the form. The questionnaire and Open House presentation materials were also posted on the Town of Neepawa website (www.neepawa.ca). A copy of the presentation story boards and questionnaire from the Open House are included in **Appendix M**. No questionnaires were completed by the participants at the Open House or on the Town of Neepawa website. The Earth Tech and Town of Neepawa representatives at the Open House generally observed that the attendees were interested in the project and were either neutral or positive towards the project.

12.1.2 Open House #2

On December 18, 2007, the second public Open House was held by Earth Tech and the Town of Neepawa to convey some of the findings of the environmental assessment to interested parties. To inform the public of this event, an advertisement was placed in the Neepawa Banner on November 30 and December 7, 2007 and in the Neepawa Press on November 26 and December 3, 2007. The Open House was also advertised on the Town of Neepawa website. A copy of the advertisement is included in **Appendix M**. The Open House event was held at the Town of Neepawa Public Library.

A similar questionnaire was provided at the second Open House for the public to express their concerns and comments regarding the project. Both the questionnaire and Open House presentation materials were posted on the Town of Neepawa website. A copy of the questionnaire and presentation story boards is included in **Appendix M**. There were three registered attendees at the second open house. No questionnaires were completed from the Town of Neepawa website. One of the attendees completed a questionnaire during the Open House. Comments that generally arose included issues such as questions about the effluent discharge to the river and the technical feasibility of effluent irrigation.

12.1.3 Open House #3

On April 15, 2008, the third public Open House was held by Earth Tech, the Town of Neepawa and Springhill Farms. Representatives from Pharmer Engineering were also present to speak to their proposed facility design. The objective of the Open House was to update the public on the design changes to the IWWTF that had occurred subsequent to the new ownership of Springhill Farms and to provide details on some of the environmental assessment findings.

To inform the public of this event, an advertisement was placed in the Neepawa Banner on April 4 and 11, 2008 and in the Neepawa Press on April 7, 2008. The Open House was also advertised on the Town of Neepawa website. A copy of the advertisement is included in **Appendix M**. The Open House event was held at the Town of Neepawa Public Library.

A similar questionnaire was provided at the third Open House for the public to express their concerns and comments regarding the project. Both the questionnaire and Open House presentation materials were posted on the Town of Neepawa website. A copy of the questionnaire and presentation story boards is included in **Appendix M**. There were five attendees at the third open house. No questionnaires were completed at the Open House or from the Town of Neepawa website. Generally, the Open House participants were there to gain knowledge about the proposed project. No concerns regarding the project were expressed to Earth Tech, Neepawa, Springhill Farms or Pharmer Engineering representatives by the Open House attendees.

12.2 SUMMARY OF PUBLIC CONSULTATION

Although there were comments about the effluent discharge to the river and the technical feasibility of effluent irrigation, generally the Open House attendees were neutral or positive towards the project. Further, the low attendance at all Open House events indicates that there is little public objection to the project.