SECTION 7.0

SECTION 7.0
CONTINGENCY PLANS AND BIOSOLIDS MANAGEMENT PROGRAM

The City of Brandon's expanded Industrial Waste Water Treatment Facility (IWWTF) and Maple Leaf Pork's operationally improved pretreatment system will have contingency plans available for: Fire, Spills, Emergency Response, Health and Safety; and, Transportation. This section of the report describes in some detail the contingency plans that the City of Brandon and Maple Leaf Pork have developed to ensure an appropriate response to unlikely, but potential mishaps. In addition, the expanded IWWTF will generate additional quantities of sludge as described in Section 4.0 of this report. The City of Brandon's Biosolids Management Program, the proposed disposal method for additional sludge, is described in some detail in the last portion of this section.

The City of Brandon is the founding member of the Brandon Emergency Support Team (B.E.S.T.). This organization is committed to emergency preparedness and is made up of a partnership between the municipal government and the business community. The City of Brandon and the business community have similar interests and responsibilities with respect to being ready for an emergency. It is B.E.S.T.'s intention that business community work with the municipal emergency services in response to an incident and act as a technical resource to civic officials so informed decisions can be made. It is the goal of B.E.S.T. to have the public, media, politicians; and, the business community educated to a level where efforts will have a positive influence on the out-come of an event. Maple Leaf Pork is a member of B.E.S.T.

Advantages to being a member of B.E.S.T. are:

- Consistent program with one consistent message.
- Easier and quicker access to the public alert system.
- Access to a variety of expertise through B.E.S.T.'s diverse membership.
- First hand information.
- Positive community profile; members viewed as responsible corporate citizens.
- Professionally run organization to inspire confidence.
- Strong membership base.
- Uniform education program based on input from members.
- Shelter-in-place/evacuation program.
- Distributed information by brochures, fridge magnets, posters; and, advertising.
- Positive media approach.
- Emergency Preparedness/B.E.S.T. web page linked to a new City designed web page.

- Coordinated identified educational programs for members.
- Coordinated training.
- Share equipment.
- Share information on current trends and issues.
- Coordination of action to safeguard the City of Brandon's IWWTF and the Maple Leaf facility in the event of emergency situations at neighbouring properties.

This program was funded for start-up by the City of Brandon ($120,000) with the expectation that the business community would share the cost. Today, there are at least 33 members. The City of Brandon provides: an Emergency Coordinator to manage B.E.S.T.'s activities; administrative support as required; and, the services of the Treasury Department for financial management. The City of Brandon is actively seeking industrial membership in B.E.S.T. on a continuous basis. The program is endorsed by the Chief of the Brandon Fire Department, the Chief of the Brandon Police Service; and, the Emergency Coordinator.

7.1 PROCESS UPSET

Although not emergencies from a public standpoint, typical expanded IWWTF upsets will generally be due to equipment breakdown or power source failure. Experience suggests that equipment breakdown stoppages at Maple Leaf Pork facilities are typically of half-hour duration, but can extend to an hour or more. Power source failures in the Brandon area are normally of a duration of four hours or less (Personal Communication – Manitoba Hydro). Maple Leaf Pork has constructed an auxiliary power supply to keep the refrigeration units powered in such circumstances. The IWWTF will have no auxiliary power; however, power shut-downs of a few hours are normally tolerable with a wastewater treatment facility without causing a process upset. The City of Brandon uses a portable generator for back-up power for the biogas blowers. Mechanical breakdowns or process upset at the IWWTF could last from a few hours to a few days. In the event that the IWWTF was down for a few days, the pretreatment plant could likely continue operating for up to two days by utilizing extra storage in the anaerobic cell. Depending upon the day of occurrence, the new equalization basin could add anywhere from zero to two days of additional storage capacity.

The Zenon membrane system is not particularly vulnerable to process upset because each group of the many membrane tanks can be individually isolated. Therefore, a problem in any given tank group can be isolated and the problem corrected while the remainder of the system remains operational. In addition, the duplicity of the system with two pre-denitrification tanks and two bioreactors adds additional flexibility to the system. However, a strong point of the Zenon system is that no matter what happens, untreated effluent will not pass the Zenon system because the treated effluent inside the membrane is the only connection to the effluent

stream (Personal Communication – Chris Jeffery, Zenon Environmental Inc.). The dependency of the Zenon system on a pumping system makes it vulnerable to a power outage however if the expanded IWWTF loses power no effluent could be pumped through the treatment system and on towards the river.

Manitoba Hydro would service the Maple Leaf Pork Processing plant including the power to the expanded IWWTF quickly in the event of a power outage. As a prime electrical customer of Manitoba Hydro, the chance of a serious process upset is remote. Furthermore, an auxiliary power supply for the expanded IWWTF will be considered if necessary.

Some question arose as to the effectiveness of the membrane system in relation to the unlikely potential for the growth of filamentous microorganisms in the Waste Activated Sludge (WAS) from the Zenon system, surviving and passing through the anaerobic lagoon to the existing activated sludge system to again cause trouble. Farmland Foods' pork plant in Iowa Falls, IA (now closed) experienced a troublesome filamentous problem for a short period. They tried numerous things to get rid of the filaments, but eventually eradicated them by turning off all aeration in the aeration basins and letting the system go anaerobic for a couple of days. Therefore, at least some species of filamentous cannot survive an anaerobic environment. Since WAS from the Zenon system is recycled back to the existing anaerobic lagoon in the City of Brandon's IWWTF, it is believed this will reduce or eliminate potential problems with filamentous microorganisms. This is the same approach that would be taken in the event the existing activated sludge system experienced a filamentous problem.

7.2 POLLUTION CONTROL EQUIPMENT

Both the expanded IWWTF and operationally improved pretreatment plant are pollution control facilities. A number of pollution control systems have been incorporated into the design of the Maple Leaf Pork pretreatment plant, including screens and Dissolved Air Floatation (DAF) equipment in the pretreatment building and the Zenon membrane filters in the expanded IWWTF.

Failure of equipment in the pretreatment building is avoided by scheduled maintenance. Both the screens and DAF equipment are quite reliable. For example, during 18 years of DAF operation in Kelowna, B.C., it is Earth Tech (Canada) Inc.'s experience that the DAF equipment has not been out of service except for scheduled maintenance. During the two-shift operation at the Brandon plant, eight hours per day will be available for routine maintenance. In addition, provided the IWWTF is not discharging effluent near its maximum allowable limits, effluent from the pork processing facility could by-pass the pretreatment stage for a period of 24 hours or so without causing treatment upsets at the IWWTF, which would occasion a licence violation. This would be co-ordinated with the City of Brandon IWWTF

personnel. If the pretreatment facility was down for an extended period, the City of Brandon could enforce its agreement with Maple Leaf, not accept the over-strength influent to the IWWTF and thereby force Maple Leaf Pork to curtail its operations.

New pollution control equipment in the expanded IWWTF will consist primarily of Zenon membrane filters all of which are also subject to regularly scheduled maintenance, normally low-pressure backwashing. If and when a membrane filter will not function as specified, the filter unit will be removed and replaced with a similar new unit. As indicated earlier, the nature of the Zenon filter ensures that only treated effluent can exit the system.

During construction, pollution control equipment will include silt fences and a clay-based refueling area. Although the probability of failure is low, silt fences will be replaced if malfunctions occur; and, any spills of fuel will be cleaned up immediately. In addition, heavy equipment will be well maintained during construction to prevent unnecessary emissions. Seeding operations will be undertaken following construction to mitigate erosion and allow removal of the silt fences.

7.3 FIRE

An internal Fire Response Crew trained in emergency response procedures has been formed from each shift within the Maple Leaf Pork processing plant. The responsibility of the Fire Response Crew is to assess, contain and communicate any emergency stemming from the threat of fire. The Fire Response Crew will summon and direct the City of Brandon Fire Department, which would respond to any reported fire at either the pretreatment plant or the IWWTF. To further counteract fires dry extinguisher systems will be installed in the pretreatment area. Fire hydrants have already been installed outside of the existing IWWTF and pretreatment plant. Additional fire hydrants will be installed around the building housing the Zenon membrane system. The water supply for all fire fighting operations will be supplied from the City of Brandon water supply grid.

7.4 ACCIDENTS

7.4.1 Spills

In the unlikely event of a spill during the operation of the expanded IWWTF or operationally improved pretreatment plant, the spill will be immediately reported to the City Engineer or his designate or the Plant Manager, as appropriate. Spills during construction will be reported immediately to the Plant Manager and/or Site Engineer in the case of Maple Leaf Pork; and, to the City Engineer or his designate in the case of the City of Brandon. If the spill is judged to be over 68 litres (15 Imperial Gallons), Manitoba Environment (24-hour Emergency Line 1-204-945-4888) will be informed immediately. In addition, during construction the Site

Engineer or the City Engineer or their designates will inform Earth Tech (Canada) Inc.'s Environmental Services engineers to initiate and co-ordinate clean-up and monitoring of the spill. During operations, should a major spill occur at the pretreatment plant the Maple Leaf Emergency Response System will respond and if necessary the Brandon Emergency Support Team. An emergency spill at the expanded IWWTF will be responded to by the City's Fire Department and again, if necessary by the Brandon Emergency Support Team.

The Zenon system does not generally require chemicals as indicated by the Zenon Pilot Project at the Maple Leaf Pork processing plant in Brandon for the process; but chemicals will be made available as backup for a source of BOD and are definitely required in the cleaning and maintenance of the filters as well as phosphorus precipitation. The likely chemicals and their uses are as follows:

- FERRIC CHLORIDE: used to precipitate phosphorus from the wastewater so that the membrane system can be used to remove phosphorus from the effluent.

- LIME: used to control the pH within the bioreactors during nitrification of ammonia; a by-product of the reaction is an excess of hydrogen ions causing the pH to fall, which would cause the process to stop if the acidic condition were not corrected with lime. It was found that lime was not required during the Pilot Plant operation; however, the provision for the addition of lime in the full-scale prototype will be provided in case it is ever needed.

- METHANOL OR ALTERNATE CARBON SOURCE: denitrification requires a readily available source of carbon that normally is provided by the biochemical oxygen demand (BOD); however, a back-up system using methanol or another source of carbon will be provided to the denitrification tanks. Again, the Pilot Plant operation indicated that additional carbon was not required; however, a back-up source of carbon will be provided in case it is ever needed.

- CITRIC ACID AND SODIUM HYPOCHLORITE: an acidic bath is required for cleaning the membrane filters from time to time. Citric acid is used to remove any scaling that may develop on the membranes, while a 12% solution of sodium hypochlorite is used to remove any organic fouling of the membrane. Disposal of this weak-disinfectant bath water will be back to the equalization basin. The quantities of bath water will be small relative to the flow-through volume of the equalization basin. The effect on the effluent will be negligible; and, other disinfectants used during the cleaning shift at the pork processing plant are already contained in the incoming effluent in minute quantities. The volume of 50% citric acid required is anticipated to be about 3000 L/year. Sodium hypochlorite usage is anticipated to be about 8163 L/year for

backpulse and maintenance of the membrane filters. It is currently projected that membranes will require cleaning every four months.

- Liquid Anti-Foam: Liquid anti-foam product (see Appendix B) will be available on an as-needed basis to control excessive foaming in the bioreactors. A foam control chemical is already used in minute amounts in the existing pretreatment system to control foam overflow of the DAF system. Use is limited to 0.5 to 1.0 litre per day into a flow of over 5 million litres per day for the DAF. The IWWTF storage of antifoam at the site will be approximately one or two-205 L (45 gallon) drums

The ferric chloride will be used on a daily basis to reduce the phosphorus content of the effluent to acceptable levels. The anticipated usage is 595,000 L per year at 40% concentration.

Lime is currently used at the existing IWWTF to control the pH during the nitrification process. The amount of lime used at the site for second shift would not be anticipated to more than double the amount currently used. Currently, one truck load (22 metric tones/load) of lime is delivered per month. Because the lime source for the Zenon system is for back-up only, the additional requirement for lime is not anticipated to generate significant traffic or risk of spills. A supplemental carbon source is not currently used at the existing IWWTF or the pork processing plant. Since the carbon source would be used for back-up only, it is not anticipated to generate significant traffic or to increase the risk of spills significantly. However, since methanol may be used, and is a hydrocarbon, its storage will meet the requirements of Manitoba Conservation including double-lined storage containment, alarms, etc. depending on the volume that will be required.

In summary the quantities of citric acid and sodium hypochlorite used for the disinfectant bath for the Zenon filters are anticipated to be no more than 3000 L and 8163 L respectively on an annual basis. Ferric chloride use at the facility is anticipated to be 595,000 L per year and the usage of anti-foam product at the facility is anticipated to be approximately 4-5 litres per month. The chemicals will likely be supplied in totes or drums and will be properly stored at the facility. Proper storage and handling precautions will be practiced to minimize the risk of either becoming likely contributors to significant spills.

7.4.2 Accident Prevention

In Manitoba, worker protection is provided through legislated standards, procedures; and, training under the Workplace Health and Safety Act. All construction practices undertaken on the site will be carried out in accordance with the Workplace Health and Safety Act to minimize health and safety impacts. The Site Engineer and/or IWWTF Operator will phone the Brandon Emergency Number for ambulance (729-2400) in case of a severe accident. The

Contractor will be required to report all accidents to Workplace Safety and Health in Brandon (726-6361) or the 24-hour Emergency Reporting Line in Winnipeg (1-204-945-0581). In addition, contractors will be encouraged to hold regular safety meetings throughout the construction process.

A safety specialist is already employed at the Maple Leaf Pork processing plant, who would respond during operation of the expanded IWWTF plant. The safety specialist has the title of Healthand Safety and Manager. She is responsible for the development and education of workers, and the co-ordination of an Emergency Evacuation Plan, among other responsibilities.

Safety is a large part of the training program for workers at the City of Brandon and the Maple Leaf Pork plant. The City of Brandon and Maple Leaf Foods Inc. will encourage workers to take real pride in programs such as "Number of Accident Free Days on Site" and in making the Brandon plant a safe place to work. The City of Brandon continually updates its safety procedures and is currently developing an Employee Orientation Safety Manual. The City of Brandon has also recently conducted Safety Audits of its water and waste water treatment facilities and will continue to do so on a regular basis.

7.4.3 Transportation

In the unlikely event of complete traffic disruption affecting access to the expanded IWWTF from the west along Richmond Avenue, other temporary access can be utilized. Major transportation routes provide easy access to Richmond Avenue. Access from both the east and west on the TransCanada Highway will be provided to Richmond Avenue via P.T.H. #110, as will plant-generated traffic from P.T.H. #10 North. P.T.H. #10 North traffic generally use the Trans Canada Highway to link up with P.T.H. #110. Since completion of the Eastern Access Route, plant-generated traffic to or from south of Brandon using P.T.H. #10 South can access Richmond Avenue as can other traffic from about 1 km west of the plant. This 1 km stretch of Richmond Avenue will be fairly critical to good access to and from the plant. With the new access provided on the east side of the Maple Leaf site, trucks hauling hogs to the plant after introduction of the second-shift will proceed eastward on Richmond Avenue past the current entrance to 65th Street East. Here the trucks will turn north on 65th Street East and then left into the expanded holding pen area. However, in an emergency, traffic could be re-routed around Section 9 Twp. 10 Rge 18 WPM to approach the plant from the east; that is, from the junction of P.T.H. #110 and Richmond Avenue, traffic would proceed south on 149th Street East, east on the road allowance south of Section 9, and then north on 65th Street East. The hog trucks would continue north on 65th Street East past the intersection with Richmond Avenue, while most vehicles would turn left onto Richmond Avenue and then continue west to the plant entrance off Richmond Avenue.

During construction of the second-shift expansion of the IWWTF, it is recognized that road and highway closures may slightly impact the construction schedule. However, the site is afforded high capacity access by both the Eastern Access route and Richmond Avenue East, as well as other smaller roads which provide opportunities to re-route traffic to or around the site.

Any additions to traffic due to the addition of the second-shift were addressed in the original Maple Leaf Pork plant application and as a result are already licenced.

7.5 EMERGENCY RESPONSE AND ENVIRONMENTAL MANAGEMENT SYSTEMS

7.5.1 Emergency Response

Emergency Response Plans exist for power failure events and fire events, communication protocols exist for such items as reporting and responding to any potential license exceedence to Manitoba Conservation. There are approximately 24 General Operating Guidelines documents that range in subject from Emergency Venting of the Biogas to Operating the UV Disinfection System in manual mode.

An emergency response manual exists at the Maple Leaf Pork plant that covers the operationally improved pretreatment plant. The overall plan is reviewed and updated annually and addresses a wide range of potential specific emergencies including: fire, ammonia leaks, boiler room and maintenance, grass fires, bomb threat; and, first aid station location. It also provides information on the management response team, evacuation, contact lists, specific emergency plans, security, roles and responsibilities; and, more. The Maple Leaf emergency response plan ends with a “chain of command” and organizational chart.

Any emergencies at the City of Brandon’s IWWTF will be have the support of the Brandon Emergency Support Team (B.E.S.T.) described earlier in this section.

7.5.2 Environmental Management Systems

While neither Maple Leaf Pork or the City of Brandon have a formal environmental management system (EMS) in place, both have many of the key components of well-known EMSs in place.

The City of Brandon waste water treatment section has developed a number of written procedures, protocols and emergency response plans which are designed to assist the operators in areas concerning plant operation, worker safety and environmental stewardship. These documents are in the forms of General Operating Guidelines, Communication Protocols; and, Emergency Response Plans. The input for creating these documents is based on operator and industry knowledge, as well as conducting hazard analyses as required. The approach adopted is to elevate environmental stewardship, worker safety; and, plant operations to an equal level

so that no one element becomes more important than any other. No operation is conducted without due consideration given to the operational objective, worker safety; and, environmental stewardship.

Maple Leaf Foods, Inc. recently updated its environmental policy, entitled "Our Environmental Commitment" in June 2002. This forms the foundation upon which its environmental programs are based. This policy is supported by commitment at all levels of management and supervision within the Maple Leaf Foods, Inc. and Maple Leaf Pork organizations through their regular review of environmental performance and investment in environmental protection and enhancement projects. Maple Leaf Foods, Inc. has undertaken a systematic review of the environmental aspects and impacts of its operations and activities. It understands and tracks environmental legal and regulatory requirements applicable to its operations and activities, has set internal performance improvement targets related to environmental matters and has established corporate environmental objectives and targets. Environmental programs and procedures are being developed and implemented across the organization. Maple Leaf Foods, Inc. recently completed an environmental awareness training program across the country, with more than 70 managers, supervisors and key workforce environmental staff from the Brandon plant participating in this training. The company has significantly increased its resources in environmental management in the past 2 years, and has invested more than $30 million in environmental infrastructure and management procedures in the past year. Maple Leaf Foods, Inc. prepares regular internal reports on its environmental performance, in addition to external regulatory performance reporting. Responsibilities and accountabilities for environmental matters are well defined within the Maple Leaf organization, both at the corporate and local level. Locally, Maple Leaf Pork maintains operating procedures related to the operation of the processing plant as it affects the environment, including such areas as handling and storage of raw materials and wastes, production and maintenance processes, storage of products and by-products and emergency preparedness and response. Maple Leaf Foods, Inc. also undertakes environmental reviews of its major plants, including the Brandon plant, with a view to identifying areas for improvement and development of corrective actions where necessary. All of this is done with a view to continually improving the company's environmental performance.

7.6 BIOSOLIDS MANAGEMENT PROGRAM

The City of Brandon is already experienced in operating a successful biosolids management program since it has operated one intermittently since 1990 and annually since 2000. Hauling of biosolids normally takes place in the fall after harvest is complete, but before snow covers the ground. Spring spreading has also been carried out by the City of Brandon. The City maintains a list of lands suitable for receiving the biosolids as a soil conditioner and for its fertilizer value. The City has had no problem in obtaining farmer consent and those farmers

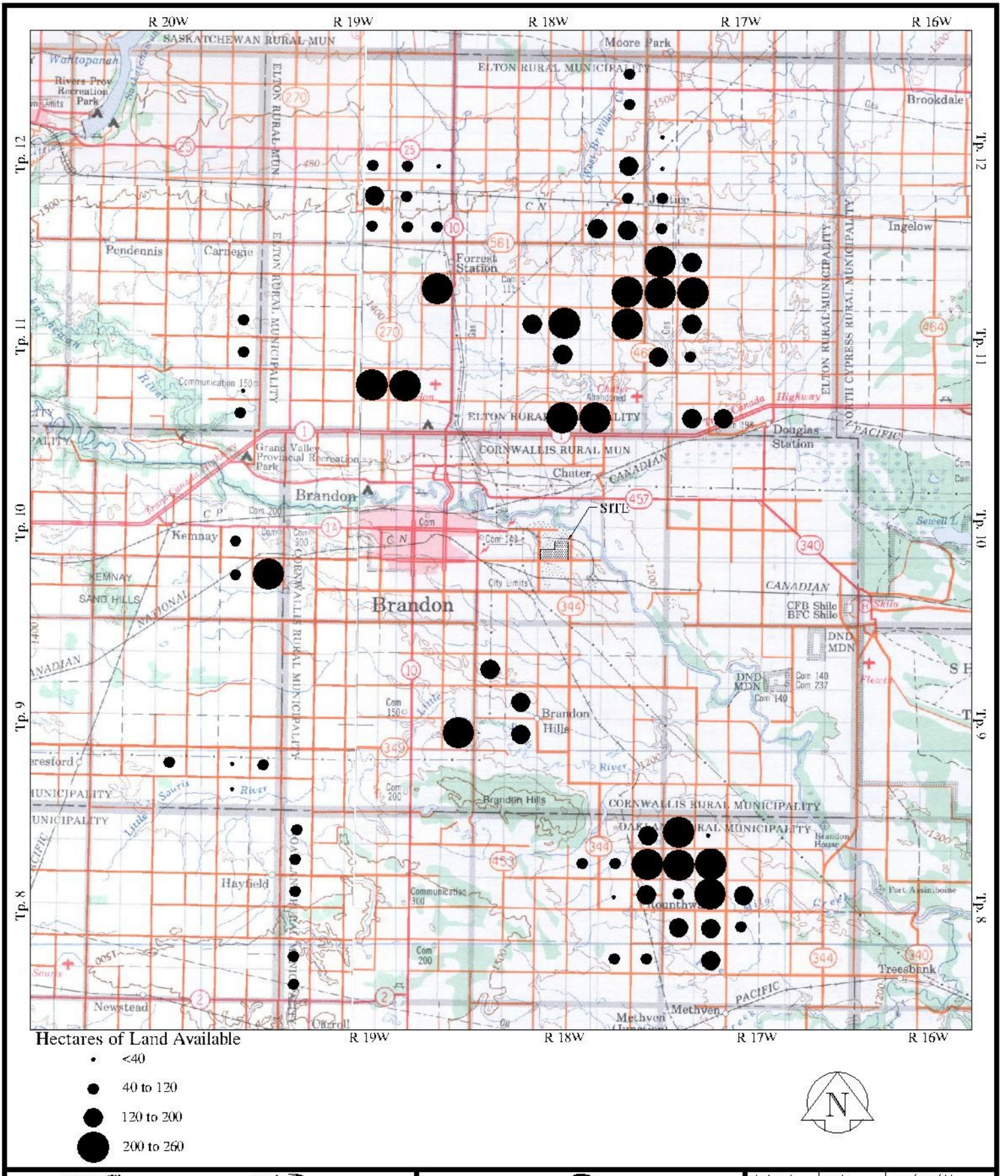
that received the biosolids have been satisfied (Mr. Doug Marvin - Douglas Area SW13-11-18W). In fact, those that have received biosolids previously are anxious to become eligible again to receive the biosolids again (Jim Hargreaves – South of Brandon – 20-9-18W).

In 1999, the City of Brandon commissioned a report prepared by Reid Crowther & Partners Ltd. (RCPL 1999) in support of its Environment Act Licence 2367 S1 for sludge disposal from Maple Leaf Foods' first shift. At that time, the estimated amount of sludge generated annually from a single shift was 489.1 dry tones or 16,500 m^3 of diluted sludge. It was estimated that the gross area of land required to receive this amount of sludge was estimated to be between 195 hectares (481 acres) and 415.7 hectares (1027 acres); in other words, one or two sections of land annually. This report also identified the available land for spreading sludge within a 15 km radius of the IWWTF to be 2750 hectares (6,800 acres) as shown on Figure 7.1. The report acknowledged there are additional secondary sites within this area identified on air photos that would potentially be capable of receiving sludge although the landowners were not canvassed and the land was not ground-truthed.

Based on the above numbers in 1999 the City of Brandon had identified enough land within a 15 km radius of their IWWTF to receive a single coverage of biosolids for a minimum period of about seven years and a maximum of 14 years. In 2001 and 2002, the City of Brandon spread an estimated total of 562.9 dry tonnes (17,584 wet tonnes) of biosolids on 122.8 hectares (303 acres) of land indicating a solids content of 3.2% on average. These years included the Maple Leaf ramp up period and other periods when there was less than full production. The existing IWWTF was originally designed to accommodate 1340 kg/d in the anaerobic basin which translated into a biosolids production of approximately 16,500 m^3 per year at 3% solids content under full single shift operation at the processing plant. Under the new two-shift, full production design flows and loads predicted to be treated by the expanded IWWTF and including the additional sludge generated by the additional nutrient removal methods, annual biosolids production is estimated to be 49,433 m^3/yr (3.75% solids content).

In more detail, the total sludge production after digestion together with the plant-available nutrients of the two-shift plus one clean-up shift from the Maple Leaf Pork processing plant is based on the maximum annual kill of 5,058,000 hogs/year. Annual sludge production, including: sludge generated by anaerobic treatment; WAS from the existing plant and the new Zenon system and sludge from the chemical precipitation of phosphorus are as follows:

- Dry Solids = 1,853,750 kg/year
- Wet Solids @ 3.75 % TSS = 49,433,333 kg/year
  = 49,433 m^3/year
- Total Kjeldahl Nitrogen = 112,260 kg/year
- Plant-Available Phosphorus = 43,850 kg/year



designed: CB	scale: 1:6500	yyyy/mm/dd: 2003/03/06	
drawn: CB	project no.: 57730		
checked: SJB	drawing no.: 7.1	rev.	
approved: KMA			

EARTH TECH
A tipo INTERNATIONAL LTD. COMPANY
Earth Tech (Canada) Inc. Winnipeg, Manitoba 204.477.6381

Distribution of Lands Within 25km of The City of Brandon Expanded JWWTP Identified as Suitable for Biosolids Application

L:\work\57000\57730\02a-CAD\ENV\Fig7-01.dwg 2003/03/20 02:12pm Layout:Letter jorge.ducharme

FORM 8.5x11
REV. 2002/12/11

The maximum volume of the existing anaerobic lagoon is 39,973.6 m^3. Of that volume, 11,504 m^3 will be required for anaerobic treatment of the sanitary waste and the portion of the process waste discharged to this lagoon. Another 2805 m^3 of volume will be required to equalize these flows under the worst-case scenario of five kill days per week. This leaves 25,664.6 m^3 of available volume for digestion, thickening; and, storage of the sludges sent to this lagoon. Since the annual design sludge production is nearly double the remaining capacity of the existing anaerobic lagoon, sludge will have to be withdrawn for land application twice a year. It should be noted; however, that this calculation assumed a very high level of annual sludge production, which will not occur the first few years of double-shift operation.

Earth Tech (Canada) Inc. undertook a review of additional lands available within a 25 km radius of the IWWTF for sludge disposal. The area reviewed essentially includes one Township or Range beyond those already considered; that is, those Townships and Ranges 9.6 km (6 miles) beyond the 15 km radius. This annulus contains about 78% more land area than the original 15 km radius. Earth Tech reviewed air photos, groundwater hazard area maps; and, soils maps of the areas in order to define potential sludge disposal lands. The lands thus identified were then ground proofed comparing to the aerial photographs. The area east of Brandon towards Shilo was eliminated because it falls within a groundwater hazard area. The largest potential areas are around Rounthwaite to the southeast of Brandon, west and southwest of Brandon towards Kemnay (beyond is a groundwater hazard area) and north and northeast of Brandon. Table 7.1 gives the number of hectares potentially available in each of the Townships considered.

Table 7.1: Preliminary Sites Identified for Potential Sludge Application within the Annulus of 15-km and 25-km Radius of the City of Brandon's IWWTF

Section	Township	Range	Hectares (Acres)	Section	Township	Range	Hectares (Acres)
8	8	17W	194 (480)	12	9	20W	40 (100)
16	8	17W	81 (200)	11	10	20W	89 (220)
17	8	17W	146 (360)	12	10	20W	235 (580)
18	8	17W	121 (300)	14	10	20W	40 (100)
19	8	17W	81 (200)	1	11	20W	73 (180)
20	8	17W	202 (500)	12	11	20W	32 (80)
21	8	17W	121 (300)	13	11	20W	49 (120)
29	8	17W	243 (600)	24	11	20W	40 (100)
30	8	17W	223 (550)	6	12	17W	97 (240)

Section	Township	Range	Hectares (Acres)	Section	Township	Range	Hectares (Acres)
31	8	17W	223 (550)	7	12	17W	73 (180)
32	8	17W	24 (60)	18	12	17W	32 (80)
11	8	18W	40 (100)	19	12	17W	32 (80)
12	8	18W	65 (160)	1	12	18W	186 (460)
23	8	18W	32 (80)	2	12	18W	146 (360)
24	8	18W	146 (360)	12	12	18W	40 (100)
25	8	18W	259 (640)	13	12	18W	121 (300)
26	8	18W	40 (100)	25	12	18W	65 (160)
27	8	18W	81 (200)	36	12	18W	101 (250)
36	8	18W	162 (400)	1	12	19W	81 (200)
6	8	19W	113 (280)	2	12	19W	81 (200)
7	8	19W	81 (200)	3	12	19W	81 (200)
19	8	19W	113 (280)	10	12	19W	200 (495)
30	8	19W	65 (160)	11	12	19W	40 (100)
31	8	19W	57 (140)	13	12	19W	32 (80)
1	9	20W	113 (280)	14	12	19W	113 (280)
2	9	20W	32 (80)	15	12	19W	101 (250)
11	9	20W	24 (60)	**Total**	**Acreage**	**15-25km**	**5348 (13,215)**

The ground-proofed land area suitable for receiving biosolids in the Townships contained in the annulus from 15 km to 25 km surrounding the IWWTF has been estimated at 5,350 hectares (13,215 acres) or more than four times the annual amount required under full production (1245 ha), assuming similar biosolids limiting characteristics. The potentially suitable land in this area is nearly twice the amount of suitable land for spreading sludge within a 15 km radius of the IWWTF (2750 hectares or 6,800 acres). It should be noted that additional lands within a 25 km radius of the IWWTF might be suitable for receiving biosolids, but in general they would comprise relatively small parcels (<32 hectares; 80 acres). The distribution of lands identified as suitable for biosolids application are shown in Figure 7.1.

When ground proofing the potential areas in the Townships between a 15 km and 25 km radius at least one farmer in each general area was interviewed to assess their interest in

receiving biosolids from the City of Brandon; either from the municipal plant or the IWWTF. The program was briefly described to each farmer followed by the question: "Would you be very interested, interested or **not** interested in receiving biosolids from the City of Brandon?" Near Rounthwaite, Mr. George Oliver (2-9-18W) was contacted who indicated he would be interested only in the fall, while Mr. Jim Maher (W1/2 16-8-17W and S1/2 17-8-17W) indicated he would be very interested. South of Kemnay, Mr. Jim Hansen was contacted who indicated he would be very interested in receiving sludge. Northwest of Forrest, Mr. Jim Sparrow (3-12-19W) was contacted who indicated he would interested in learning more about the program. Northeast of Forrest, Earth Tech contacted Mr. Jim Miller (6-12-17W) who has land near Doug Marvin. Mr. Miller indicated he would want to know more about the biosolids before committing to having an interest. It is anticipated that, in general, once one farmer in an area is satisfied with the results of receiving biosolids it will be little challenge to get other farmers to join the program.

It was noted during this investigation that between a 25 km radius and a 35 km radius the suitable soils for spreading biosolids are very prevalent, particularly the Newdale clay loams to the north and northeast, the Carrol clay loams to the southeast, the Beresford clay loams to the southwest and the Carrol clay loams to the west. This annulus contains 1.75 times as much land as the original 15 km radius and it would appear to contain a much higher percentage of useable lands for biosolids spreading than lands within the 25 km radius. Therefore, there are likely sufficient lands available for biosolids spreading for decades to come within a 35 km radius of Brandon. It is recognized that haul distances are important to keeping a biosolids program economical and that suitable lands closest to the source would tend to be utilized first.

Since it now appears the application of biosolids must take place in both fall and spring, the City of Brandon undertakes to prepare a more considered approach to securing land for biosolids application. The City of Brandon does not anticipate the full estimated biosolids weights or volumes to materialize for several years, since although the maximum theoretical hog throughput at Maple Leaf Pork is 108,000/wk, the ramp-up to full production will occur over several years. Maple Leaf Pork also assumed quite conservative design flows that have not materialized in the first-shift; and the predicted volume of biosolids also may not materialize during the second-shift. The reality may prove to be one full withdrawal of biosolids in the fall, with a smaller spring withdrawal. The City of Brandon anticipates that the current biosolids application licence will be sufficient for the first couple years of operation while the hog production is still in ramp-up mode. Following that the application plan will be further examined and modified as necessary for future years.

Nevertheless, preparation will be made on the basis of both fall and spring application of biosolids. Some farmers will not accept the biosolids in spring because they risk the

possibility of it interfering with seeding. In the event there is a scarcity of available land in the spring, other strategies can be brought into play. For example, in dry or normal springs some farmers will still accept biosolids; that is, on large farms they can't be seeding all areas at once. However, in wet springs it will possibly be necessary to have summer fallow or hay lands secured for receiving biosolids. It will be important not to use such lands up prematurely or unnecessarily. Also, in dry falls the spring situation could be alleviated, if necessary, by emptying the biosolids from the anaerobic lagoon twice: once in early fall and again in late fall. In this manner, the amount of land required in spring can be minimized.

The City of Brandon has recently tendered the work of its Biosolids Management Program to consulting firms within Manitoba. The City of Brandon operates its Biosolids Management Program under two Manitoba Environment Act Licences: Licence 2485 for its Municipal WWTF and Licence 2506 for its IWWTF. Both licences soon require renewal. Although the licences are currently slightly different, the following provides the essence of each.

The work required under the City of Brandon's Biosolids Management Program generally consists of:

- Annual review of the existing licences and propose changes, if any, to Manitoba Conservation.
- Secure suitable and sufficient lands for biosolids application.
- Prepare operating plan and submit to Manitoba Conservation.
- Prepare public notifications of biosolids application areas.
- Prepare tender documents for biosolids application.
- Evaluate tender submissions.
- Provide non-resident engineering services to address contractor/bidder requirements.
- Provide resident engineering services during the application of biosolids.
- Provide annual reporting to Manitoba Conservation.

The type of detailed information required is as follows:

During application:

- Volume and solids content of biosolids removed daily;
- Volume and solids content of biosolids applied to each site; and,
- Submit details by December 31st and details of future revised sampling; and analysis program at least 30 days prior to being implemented.

Annually monitor biosolids application sites used in the prevailing year to determine:

- Schedule A parameters in the soil;
- Slope of the surface;
- Presence of clay/clay till within 1.5 m of the surface;
- Number of hectares that can receive biosolids; and,
- Number of hectares on, which biosolids were applied on a daily basis.

30 Days prior to application

- Supply one set of scaled drawings for sites intended to be used that year.

Annually monitor according to Schedule A and B:

- Biosolids composition;
- Background concentrations of soil parameters for each parcel of land; and
- Crops grown on land on which biosolids have been applied during the previous 3-year period.

On or before March 15th of each year submit a report to Manitoba Conservation for the previous year including:

- Details of the injection program including;

  Description of each parcel that received biosolids;

  Schedule A background soil concentrations;

  Dry weight of the biosolids applied per hectare;

  Weight of heavy metals added to each parcel as per Schedule A in mg/kg of soil; and,

  Cumulative weight of heavy metals in kg/ha for each parcel of land by adding heavy metals applied in biosolids to background heavy metal concentrations;

- The amount of N, P, and K added per hectare for each parcel of land;
- Results of the analysis and determinations made respecting biosolids and soil;
- Copy of analytical procedures used and results of analysis of reference materials in accordance with Schedule B; and,
- The type of crops grown on the land on which the biosolids were applied during the previous three years as of the date of application of the biosolids.

Schedule A in typical biosolids disposal licences on farmland lists the sampling and parameter analysis requirements for the biosolids and soil. Schedule A requires a composite sample of the biosolids each year from a minimum of eight different locations distributed by surface area

and depth throughout the sampled cell; requires the analysis of biosolids for at least 18 parameters; and, requires analysis of at least 11 parameters of the soil to receive the biosolids from the 0 to 15 cm depth and both nitrate nitrogen and total nitrogen from the 0 to 60 cm depth.

Schedule B in typical biosolids disposal licences on farmland lists procedures for heavy metal testing in the soil and biosolids including procedures for sample preparation, procedures for sampling of both biosolids and receiving soils, and a required laboratory quality assurance program with allowable deviations of nine heavy metal parameters from a reference material.

Biosolids application to farmland is a common practice and procedure throughout North America. The City of Brandon is confident that their Biosolids Management Program is sustainable for years to come because of an identified abundance of suitable agricultural land for receiving the biosolids; and, a competent experienced staff to knowledgeably manage the Program.