# Environment Act Proposal – Thicket Portage Water Treatment Plant

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# Executive Summary

The existing water treatment Plant (WTP) for Thicket Portage cannot adequately treat raw water to meet the Guidelines for Canadian Drinking Water Quality (GCDWQ) and the new provincial *Drinking Water Safety Act (DWSA)*. An upgraded water treatment plant is required to meet GCDWQ and DWSA requirements. It is proposed that the new WTP work will consist of:

- Replacement of raw water pump house pump systems and controls;
- A new Water Treatment Plant Facility consisting of slow sand filtration with pre-ozonation treatment system, chlorine disinfection system, treated water storage and a water distribution system;
- Underground concrete settling tank for primary treatment of the process residual streams; and
- Outfall line discharging the residual waste from the underground concrete settling tank to an existing drainage course.

In addition, provisional items to be constructed providing adequate funding is available include:

- Replacement of approximately 100 to 200 meters of the raw water supply line between the intake pump house and water treatment plant.
- Emergency backup generator for the water treatment plant electrical systems.

Funding for the construction of the WTP is provided by the Municipal Rural Infrastructure Fund.

Mitigation of adverse impact of the project to the environment includes:

- Provision of a settling tank for primary treatment of process residual streams before it is discharged into the existing drainage course that drains into Landing Lake.
- Close monitoring of construction equipment and overall construction operation.
- Installation of spill decks for containment of chemical spills.
- Installation of a double walled tank for diesel used for the generator.

In terms of follow-up plans, a resident engineer will be on site for critical phases of the project to check that the contractor constructs the project in general conformance with the design and specifications. Prior to the new water treatment system being placed into service, the contractor will collect and analyze treated water samples to demonstrate that the finished water quality meets or exceeds the guidelines for Canadian Drinking Water Quality and the DWSA.

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APPENDICES

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# 1.0 Introduction

## 1.1 BACKGROUND

The Community of Thicket Portage is located approximately 550 km north of Winnipeg and 50 km south of Thompson. The Community's current water supply is Landing Lake. The raw water supply system consists of a 150ø intake line, raw water pump (duty + shelf spare) and 100ø raw water line to convey the raw water from Landing Lake to the Water Treatment Plant (WTP). The WTP is located approximately 1.4 km from the raw water pump house. The existing WTP includes a multimedia pressure filter, chlorine disinfection, two above ground storage reservoirs and centrifugal distribution pumps. A new building expansion sized at approximately 18.3 m x 10.7 m was added on to the existing WTP in the summer of 2012 to accommodate a future facility upgrade.

The issues with the existing water system include freezing and breaks in the raw water line from the pump house to the WTP, lack of proper treatment and lack of adequate storage capacity. The facility is over twenty years old and mechanical and electrical components are in poor condition and nearing the end of their effective service life.

An "Existing Water Treatment Plant Assessment Study" (Stantec & Cochrane, 2002) was undertaken by MANA and Thicket Portage in 2002. The study recommended upgrades to the raw water pumping system and a new WTP.

The treatment process cannot adequately treat the raw water to meet the Guidelines for Canadian Drinking Water Quality (GCDWQ) and the new provincial Drinking Water Safety Act (DWSA). Raw water characteristics from Landing Lake are shown in Table 1.1 and included in **Appendix C**.

**Table 1.1 – Historic Raw Water Quality from Landing Lake**

| Parameter | Unit | Historic Data | | GCDWQ / DWSA Limits MAC/*AO* |
|---|---|---|---|---|
| | | Low | High | |
| Alkalinity, Total ( as $CaCO_3$) | mg/L | 81 | 96.1 | |
| Arsenic | mg/L | 0.0003 | 0.0005 | **0.01** |
| Bicarbonate (HCO3) | mg/L | 99 | 117 | |
| Bromide | mg/L | < 1 | < 1 | |
| Bromodichloromethane | µg/L | 3.2 | 3.3 | 16 |
| Calcium | mg/L | 20.9 | 26.2 | |
| Carbonate (CO3) | mg/L | < 0.5 | < 0.5 | |
| Chloride | mg/L | 0.52 | 0.56 | *250* |
| Conductivity | umhos/cm | 165 | 197 | |
| Total Dissolved Solids (TDS) | mg/L | 90 | 123 | *500* |
| Fluoride | mg/L | 0.06 | 0.1 | **1.5** |
| Haloacetic Acids [c] (HCAA) | µg/L | 30 | 53.2 | **80** |

| Parameter | Unit | Historic Data | | GCDWQ / DWSA Limits |
|---|---|---|---|---|
| | | Low | High | MAC/*AO* |
| Hardness (Total) $CaCO_3$ | mg/L | 77.3 | 96 | 200/500 [a] |
| Hydroxide (OH) | mg/L | < 0.5 | < 0.5 | |
| Iron | mg/L | < 0.01 | 0.06 | *0.3* |
| Langelier Saturation Index (4ºC) | | -1.25 | -0.95 | |
| Langelier Saturation Index (60ºC) | | -.21 | 0.094 | |
| Magnesium | mg/L | 6.11 | 7.62 | |
| Manganese | mg/L | 0.0028 | 0.0045 | *0.05* |
| Nitrate and Nitrite | mg/L | 0.05 | 0.11 | **10** |
| pH | pH units | 7.26 | 7.77 | *6.5 - 8.5* |
| Potassium | mg/L | 0.86 | 1.11 | |
| Sodium | mg/L | 3.1 | 4.69 | *200* |
| Sulphate | mg/L | 2.30 | 2.5 | *500* |
| Total Organic Carbon | mg/L | 7.5 | 10 | |
| Total Trihalomethanes [c] (TTHM) | µg/L | 103.2 | 143.3 | **100** |
| True Color | CU | 5 | 15 | *15* |
| Turbidity | NTU | 0.4 | 1.0 | **0.1/ 0.3/ 1** [b] |

MAC = Maximum Acceptable Concentration, AO = Aesthetic Objective

Highlighted rows indicate parameters which exceed the GCDWQ / DWSA Limits

[a] Hardness levels greater than 200 are considered poor, but tolerable, while hardness levels greater than 500 are generally considered unacceptable

[b] Membrane filtration ≤ 0.1 NTU 95% of the time & never to exceed 0.3, chemically assisted filtration ≤ 0.3 NTU 95% of the time & never to exceed 1 NTU, slow sand ≤ 1 NTU 95% of the time & never to exceed 3 NTU

[c] Treated water samples taken from the WTP (HAA) and from distribution system (TTHM).

## 1.2 RECOMMENDED PLAN

Stantec Consulting Ltd. (Stantec) was retained by Manitoba Aboriginal and Northern Affairs (MANA) to undertake the Preliminary Design, Detailed Design and Contract Administration for a new Water Treatment Plant (WTP) upgrade for the Community of Thicket Portage.

Stantec & Cochrane (2002) identified the 2002 population as 225 people. As stated in the 2013 Preliminary Design Report by Stantec Consulting Ltd., a 2006 census indicated a population of 165 people, but subsequent discussions with MANA and the Community Council resulted in the current population being estimated as 200 people. The Preliminary Design Report used a 1% growth rate to determine a 20 year design population of 244 people.

The upgraded water treatment facility is proposed to consist of the following new infrastructure:

- Raw water pumping system, including a portion of the raw water supply line downstream of the pump house.

- Dual train slow sand filtration with pre-ozonation package plant.
- Chlorine disinfection feed system.
- Exterior and buried concrete settling tank for primary treatment of the treatment trains' backwash waste.
- Outfall line discharging the backwash waste from the exterior concrete tank into an existing drain course leading to Landing Lake.
- Rinse-to-waste outfall line discharging into an existing drain course leading to Landing Lake.

The slow sand filtration process has four waste streams. Although waste volumes are approximate, they are estimated for each train as:

- Roughing filter back flush (4.89 $m^3$/back flush over a 5 minute duration)
- Roughing filter rapid up-wash (5.45 $m^3$/up-wash over a 5 minute duration)
- Slow sand filter surface cleaning (5.45 $m^3$/cleaning over a 10 minute duration)
- Rinse-to-waste (6.5 $m^3$/cycle over a 60 minute duration)

Typically, a slow sand filtration plant is expected to require cleaning/backwashing approximately once every 2 to 6 months. An assumption of a 3 month cycle is considered conservative based on the initial raw water quality of Landing Lake. This results in an average of approximately 356 L of process backwash per day and 144 L of rinse-to-waste per day. It is recommended to provide an underground settling tank sized to hold one backwash waste cycle from a single treatment train. Any solids will settle prior to the effluent being pumped out to the existing drain course adjacent to the WTP site. The rinse-to-waste, which occurs immediately after a backwash cycle, will bypass the underground storage tank to allow time for any solids to settle out in the tank. The rinse-to-waste stream is very clean with a turbidity of 1.0 NTU or less and no chlorine addition, so bypassing the underground tank is considered acceptable. Any chlorine residual in the backwash will be allowed to dissipate while stored within the settling tank.

# 2.0 Description of Proposed Development

## 2.1 CERTIFICATE OF TITLE

The proposed WTP upgrade will be located on the same property at the south side of the Community that the existing WTP facility is located on. Stantec has been informed by MANA that there is no certificate of title.

## 2.2 MINERAL RIGHTS

Mineral rights are owned by the Crown.

## 2.3 EXISTING AND ADJACENT LAND USE AND ZONING

MANA was contacted in an effort to determine the zoning designation for the lot on which the proposed water treatment plant upgrade will be located. The community does not have specific zoning by-laws.

The proposed water treatment plant infrastructure is proposed to be constructed on the same property as the existing water treatment plant. Therefore, all available information would indicate that there are no zoning issues related to the upgraded water treatment plant location.

## 2.4 PREVIOUS STUDIES

An "Existing Water Treatment Plant Assessment Study" was completed by Stantec Consulting Ltd. and Cochrane Engineering Ltd. in 2002 for Manitoba Aboriginal and Northern Affairs (MANA) and the Community of Thicket Portage. The study recommended upgrades to the raw water pumping system and a new water treatment plant.

Stantec Consulting Ltd. was subsequently retained by MANA in 2009 to undertake the preliminary design, detailed design, and contract administration for a new water treatment plant for the Community of Thicket Portage. Although preliminary and detailed designs were completed, sufficient funding could not be made available to proceed with the construction phase.

## 2.5 PROPOSED DEVELOPMENT

### 2.5.1 Description

The proposed WTP upgrade consists of two Slow Sand Filtration with Pre-Ozonation Package Plant treatment trains, each with a capacity of 1.25 L/s, six above ground treated water storage reservoirs, post treatment chemical feed systems for chlorination (Sodium hypochlorite), distribution pumping system and WTP residual waste handling systems.

Based on a 2012 population of 200 people, the current expected average day demand is 67,400 L. The 20 year design average day demand increases to 82,228 L.

Proposed upgrades to the raw water intake system include a new pump system inside the pump house and replacement of approximately a 100 meter to 200 meter portion of shallow buried raw water line between the pump house and WTP. Raw water will be drawn from Landing Lake via the existing intake line.

The water treatment system residual streams consist of backwash and filter rinse-to-waste as summarized in Section 1.2: Recommended Plan, and detailed below:

- Roughing filter back flush (4.89 $m^3$/back flush),
- Roughing filter rapid up-wash (5.45 $m^3$/up-wash),
- Slow sand filter surface cleaning (5.45 $m^3$/cleaning), and
- Rinse-to-waste (6.5 $m^3$/cycle).

A conservative estimate of the frequency of backwashes required for a slow sand filtration system is approximately once every 3 months. With two treatment trains, this results in 8 backwash cycles being conducted per year. Therefore, the expected total annual residual waste volume is 178.32 $m^3$.

The roughing filter back flush and rapid up-wash, as well as the slow sand filter surface cleaning are performed using treated water, which will be directed to a settling tank approximately 10 meters west of the WTP. The tank will have a minimum capacity of 16 $m^3$ to allow storage of the entire water volume from these three processes, and to allow solids to settle out of the residual streams. The water in the settling tank will remain there until such time that the chlorine residual has dissipated. At this point, it will be pumped into the existing drain course, from which it will follow the natural topography to drain into Landing Lake. The effluent wastes could potentially exist in a more concentrated form within this stream. In general, the characteristics of the effluent from the settling tank will be similar to the raw water from Landing Lake, as it is essentially the same water since no chemicals are added during the treatment or backwash process. Settled sludge in the tank would be periodically hauled to the Community of Thicket Portage Lagoon. Some of the key parameters and characteristics of this waste stream are discussed below:

- Chlorine: backwashing of the filter is done with treated water that has a chlorine residual in the 0.5 to 1 mg/L range. To prevent the chlorinated water from entering Landing Lake it will be stored within the settling tank until the chlorine residual subsides. In addition, the drainage course from the WTP to Landing Lake is more than 1 km long, providing additional time for chemical free removal of chlorine residual should the settling tank be pumped out prematurely;

- pH: since the slow sand filtration with pre-ozonation process does not introduce any chemicals into the water, the pH of the waste streams are expected to be comparable to the raw water;

- Total Suspended Solids: while total suspended solids (TSS) was not tested in the raw water, however, turbidity is expected to range from 0.4 to 1.0 NTU. It is anticipated that the

backwash waste directed to the backwash settling tank will start at 200 mg/L and decrease to 20 mg/L during the backwash process. The average TSS concentration anticipated in the backwash settling tank is 100 mg/L. It is anticipated that the backwash settling tank will remove 40% of the TSS (an ideal clarifier achieves 60% reduction) and therefore the average TSS concentration directed to Landing Lake will be approximately 60 mg/L.

The rinse-to-waste occurs after the completion of the backwash and surface cleaning cycles and will be discharged directly to the existing drain course. This ensures the previous backwash can remain in the settling tank for a sufficient time period to allow removal of chlorine residual and the solids to settle out. This residual stream consists of raw water passed through the treatment system, but without any chlorine addition, and is expected to be of the same or better quality as the raw water from Landing Lake.

The treatment plant would be operated year round with an operator on-site on a daily basis to confirm the chlorine residual in the water entering the distribution system.

### 2.5.2 Project Schedule

The preliminary schedule for the implementation of the project is as follows:

| | |
|---|---|
| ***A. Design*** | |
| Complete Detailed Design | February 2013 – March 2013 |
| Submit Environmental Act Proposal | February 2013 |
| Submit Permit to Construct or Alter a Public Water System | February 2013 |
| ***B. Construction*** | |
| Receive Environment Act License | March 2013 |
| Receive Permit to Construct of Alter a Public Water System | March 2013 |
| Tender Project | March 2013 |
| Construction of entire project | April 2013 – September 2013 |

### 2.5.3 Project Funding

Funding for the WTP is provided by:

Municipal Rural Infrastructure Fund
Canada-Manitoba Infrastructure Secretariat
1140 - 363 Broadway
Winnipeg MB R3C 3N9

### 2.5.4 Approvals & Licences

The following other approvals are required for the construction of the WTP:

| **Approval** | **Agency** | **Status** |
|---|---|---|
| Drinking Water Safety Act/Permit to Construct or Alter a Public Water System | Office of Drinking Water | Submit after completion of detailed design |
| Water Rights License | Manitoba Water Stewardship | Submitted |

### 2.5.5 Public Consultation

It is not anticipated that there will be public consultations with regards to this project.

## 2.6 MUNICIPAL WATER SUPPLY SYSTEM SUPPLEMENTAL INFORMATION

### 2.6.1 Water Rights License

The Community of Thicket Portage currently has an existing Water Rights License, a copy of which is included in **Appendix B**. The license number 2011-054 is valid until December 7, 2031 and allows the Community to withdraw water from Landing Lake for municipal purposes with the following limitations:

- Maximum instantaneous rate shall not exceed 0.004 $m^3/s$
- Yearly volume shall not exceed 31 cubic decametres or 31,000 $m^3$

Based on the 20 year design maximum day demand of 82,228 L, and the fact that the WTP is designed to operate for 23 hours of the day, the projected maximum instantaneous draw rate from Landing Lake is 0.99 L/s (0.00099 $m^3/s$). This is within the limits specified in the Water Rights License.

The projected demand for the 20 year design is 30,013,220 L/year (approximately 30,013 $m^3$/year). This also falls within the allowances of the Water Rights License.

### 2.6.2 System Use

The design criteria for the upgraded WTP are as follows:

- Design Year = 2032
- Design Population = 244 people

- Per Capita Consumption = 337 lpcpd (recent water consumption records indicate that current demand is more than the projected 20 year demand. MANA has stated that they will coordinate with the community to ensure investigative work is done to determine the cause of the unusually high demand, and appropriate remedial action taken)
- Average Day Demand = 82,228 L/d
- Maximum Day Demand = 205,570 L/d
- Peak Hour Demand = 3.8 L/s
- Water Treatment Plant Capacity = 2.5 L/s
- Active Reservoir Size = 82,228 L
- Agricultural/Livestock Water Use = Unknown water use by the ice making facility at the fishery, but factored into the per capita consumption using existing water use records

### 2.6.3 Water Conservation

MANA and the Community of Thicket Portage will coordinate investigative work to determine the cause of abnormally large increases in water consumption over the past several winters. Repairs will be performed as necessary to reduce the Community's water usage to levels more commensurate with other, similarly sized northern communities.

## 2.7 STORAGE OF GASOLINE OR ASSOCIATED PRODUCTS

Fuel will be stored on the construction site within a double walled fuel tank, which in turn will be located within a leak proof spill containment structure. The fuel tank will be lockable and be located within a fenced off area of the site. An emergency response plan which includes spill prevention, notification and response will be implemented as a part of the construction specification and enforced at site. No fuelling activities will be permitted within 100 m of watercourses during construction.

## 2.8 DESCRIPTION OF EXISTING ENVIRONMENT IN THE PROJECT AREA

The Community of Thicket Portage is bounded on the south by Landing Lake and on the north by Wintering Lake, approximately 50 km south of Thompson. The WTP is approximately located on the Northeast Quarter of Section 10, in Township 73 and Range 2 West of the Principal Meridian in Manitoba.

The area surrounding Thicket Portage is characterized by boreal forests, muskeg, and wetlands interspersed with freshwater lakes, rivers, and streams. Agricultural use of the region is negligible, but fishing and hunting are widespread. This region's forests provide habitat and cover for a variety of wildlife, including black bears, otters, wolves, caribou, and landbirds. The

surrounding lakes and rivers are home to numerous fish species and provide a premiere fishing experience. The fish species known to be found in Landing Lake are listed in **Appendix D**.

The climate and meteorological conditions for Thicket Portage are measured at Thompson Airport. The average monthly temperature and total precipitation values for the community are indicated in Table 2.1:

**Table 2.1 1971 – 2000 Temperature and Precipitation data for Thicket Portage recorded at Thompson, Manitoba**

| Month | Average Temperature ($^{o}$C) | | Average Total Precipitation (mm) |
|---|---|---|---|
| | Minimum | Maximum | |
| January | -30.5 | -19.4 | 18.2 |
| February | -27 | -13.7 | 15.9 |
| March | -20.5 | -5.2 | 20.6 |
| April | -9.2 | 4.9 | 26 |
| May | -0.4 | 13.4 | 44.4 |
| June | 5.5 | 19.7 | 69.4 |
| July | 8.9 | 22.7 | 86.1 |
| August | 7.2 | 21 | 73.9 |
| September | 1.5 | 12.8 | 62.4 |
| October | -4.3 | 4.3 | 41.4 |
| November | -16.6 | -7.3 | 32.8 |
| December | -27.2 | -16.7 | 26.3 |

The surface water body near Thicket Portage is Landing Lake. It is proposed that the residual streams from the WTP would be discharged into Landing Lake via a natural drainage course as detailed previously.

No groundwater testing or geotechnical investigation was undertaken as part of this work. However, the WTP upgrade will be located on the same property as the existing WTP, which currently discharges to the adjacent drain course.

As no work is proposed within Landing Lake, its existing aquatic resources are not anticipated to be affected by the proposed upgrades.

**Appendix E** consists of site photographs that illustrate the general landscape characteristics of the proposed upgrade site. The site photographs show the area is primarily grassy surrounded by trees.

# 3.0 Description of Environmental Effects of the Proposed Development

## 3.1 POTENTIAL ENVIRONMENTAL IMPACTS

### 3.1.1 Air Quality

Vehicle emissions will occur from activities during construction and transportation of goods to the construction sites. Dust will be generated as a result of construction activities such as open excavations. Vehicle and any equipment exhaust emissions are expected to result in a potentially minor decrease in air quality. These negative impacts will also be of short term duration occurring on a continuous basis during work hours of the construction period on a local scale. Some grubbing activities may be necessary at the WTP site.

### 3.1.2 Surface Water

Minor and short term impacts on surface water may occur as a result of construction activity in road allowance ditches during runoff events. The impact on surface water would include sediment that may be eroded from excavation activities.

The operation of the WTP will result in backwash and rinse to waste streams being discharged to a natural drainage course. There is the potential for chlorine residual to be released into the natural environment and for the drainage course to freeze over in the winter months.

### 3.1.3 Groundwater

Groundwater may be susceptible to leaks and spills from construction equipment. However, the proposed site is characterized by clay till at depths ranging from approximately 0.3 m to 4.0 m below the ground surface. Shallow bedrock is also present in the area. The clay till is brown and exhibits plasticity indicating a predominantly protective clay layer.

### 3.1.4 Soil and Vegetation

The impacts on soil are considered minor. Soil may be disturbed, compacted and lost during construction activities. There is potential for soil to become contaminated as a result of leaks and spills from construction equipment and refueling activities.

Some vegetation may be lost due to clearing and grubbing activities at the WTP site and replacement of a section of the raw water line.

### 3.1.5 Wildlife

The construction activities are within the developed area of the Community and adjacent to the existing WTP, and are therefore expected to have minimal impact on wildlife habitat.

### 3.1.6 Fisheries

The Fish Inventory and Habitat Classification System (FIHCS) list 20 species for Landing Lake. A list of all fish species noted in the FICHS is provided in **Appendix D**.

Since the backwash and rinse to waste streams will not have any chemicals added to them, solids in the backwash stream will be allowed to settle out in the settling tank, and the drainage course from the WTP site to Landing Lake is over 1000 m, the overall impact on fisheries will be negligible.

### 3.1.7 Heritage Resources

The proposed work would occur on sites which have undergone previous construction. Therefore, the potential to impact significant heritage resources is considered low, and the Historic Resources Branch is expected to have no concerns with the project.

### 3.1.8 Socioeconomic Environment

Socioeconomic implications are not expected as a result of the environmental impacts as the environmental impacts are considered minor and short-term. The project will have a positive impact by providing a high quality potable water supply to meet current and future demands in the Community and in meeting the Guidelines for Canadian Drinking Water Quality. In addition, some local economic benefit is expected during the course of construction through employment of local labour.

The socio-economic environment is such that many of the community's residents are unemployed. There are no industries within the community and work for local residents is from outside the community.

There are no known public safety and health risks in the development area.

# 4.0 Mitigation Measures and Residual Environmental Effects

## 4.1 MITIGATION MEASURES

### 4.1.1 Air Quality

Emissions resulting from construction and transportation equipment may be mitigated by the utilization of well-maintained and operating vehicles while reducing unnecessary vehicle idling.

The impact of dust may be mitigated by limiting construction during high wind periods and reestablishing vegetation as soon as possible.

### 4.1.2 Surface Water

Mitigation of surface water issues may be achieved by limiting open cut trenching to within 30 m ahead or behind the pipe laying, redirecting surface water runoff, pumping accumulated water to adjacent ditches and providing erosion control practices as required. Backwash water will be stored in the settling tank to allow chlorine residual to drop to acceptable levels before discharge to the drainage course.

Installation of a double walled fuel tank for the emergency generator reduces the risk of diesel spills. Petroleum leaks or spills during construction will be mitigated by use of properly maintained equipment, use of spill clean-up equipment and materials, and use of appropriate fueling equipment. A prepared emergency response plan can be implemented in the event of a significant spill. In the event of a reportable spill, Manitoba Conservation will be notified through the emergency response line and appropriate measures will be taken according to Manitoba Conservation requirements.

A 100 m setback to watercourses will be maintained for fueling activities.

Prevention of chorine spills affecting surface water will be achieved by the installation of spill decks in the chemical storage area of the WTP.

The risk of freezing the residual stream discharge pipe and surface drainage course will be mitigated by performing backwash and rinse to waste cycles during relatively mild winter weather. Installing insulated discharge pipe and surrounding it with rigid insulation on all four sides will further reduce the likelihood of freezing. The local operators will be provided tools to break up ice formations in the drainage course.

### 4.1.3 Groundwater

Groundwater is protected by the high bedrock and natural hydrogeology in the area. Some of the spill prevention and containment measures outlined in Section 4.1.2: Surface Water will also serve to prevent groundwater contamination. The WTP will be supplied with raw water from Landing Lake, so the effects on groundwater will be negligible.

### 4.1.4 Soil and Vegetation

Impacts to soil contamination from petroleum products include preparation of an emergency response plan for potential spills, use of spill clean-up equipment and materials, using properly maintained equipment, and using appropriate fuelling equipment.

Re-establishment of vegetation as soon as possible after disturbance will limit loss of soil due to wind or water erosion. Backfilling soil stockpiles as soon as possible and minimizing the amount of soil disturbance can be implemented.

Vegetation impacts can be mitigated by minimizing the vehicle activities, and clearing and grubbing areas. Displacing whole portions of topsoil with any known rare or endangered plant species can be implemented if necessary such that this material and plants can be placed back in its original location with minimal disturbance. Re-establishment of vegetation will occur as soon as possible on disturbed areas.

### 4.1.5 Wildlife

Impacts to wildlife habitat can be limited by minimizing the area of construction, soil disturbance and vegetation disturbance. Other impacts resulting from dust or smoke will be minimized as previously indicated. Noise disturbance will be limited by use of muffling vehicles and equipment, limiting idling and limiting the construction area.

### 4.1.6 Fisheries

Fisheries impacts will be minimized because no chemicals are being added to the residual streams and the backwash will be stored in a settling tank to allow dechlorination. The extended length of the natural drainage course from the WTP to Landing Lake will also help to minimize the effects to fisheries in Landing Lake. The construction specifications will require that the Contractor implement practices to reduce soil and contaminant runoff. In addition, most of the proposed construction will be carried out within the core area of the Community away from primary water bodies.

### 4.1.7 Heritage Resources

There are no archeological concerns anticipated. If construction activities reveal any issues, the project team will work with Heritage Resources Branch to mitigate concerns as required.

### 4.1.8 Socioeconomic Environment

There are no known negative environmental socioeconomic impacts that need mitigation. The proposed development will provide a reliable supply of quality drinking water that is expected to enhance the quality of life and economic viability for the Community residents.

The proposed treatment system will be operator friendly as compared to other potential treatment systems that could meet the Guidelines for Canadian Drinking Water Quality and

Manitoba's DWSA. This, in turn, provides the Community the opportunity to allocate staff time and resources to improve other infrastructure and public services.

The local economy will be positively impacted as the project presents employment opportunities and the requirements of various services during the construction phase. The contractor will be encouraged to utilize local resources (both labour and materials) to provide economic benefit to the community and improve the socio-economic impact.

## 4.2 FOLLOW-UP PLANS

Stantec will have a resident administrator on site periodically to observe the construction activities. This person will be on site at times of critical installation work and this is presently estimated at 30 days throughout the 5 month construction period. This site presence is intended to confirm that the contractor is conforming to the design and specifications.

Applicable warranties will be applied to the operation and performance of all new structures, equipment and process components related to the water treatment plant and associated works. The Contractor will collect and analyze water samples of the treated water and report the results to the Engineer to check that the finished water quality meets the requirements of the latest edition of Guidelines for Canadian Drinking Water Quality and Manitoba Drinking Water Safety Act.