good drainage. Excessive surface waters generally do not collect upon the land but instead drain into the creek or infiltrate and recharge existing aquifers.

3.2.2 Aquatic Vegetation

Local riverine macrophytes are typically found in inland meandering prairie rivers and creeks, with various pondweeds in the river/creek mainstem, and *Carex spp.* (sedge), *Scirpus spp.* (bulrush), *Typha spp.* (cattail) or *Phragmites spp.* (marsh reed) found along the margins. Presence of macrophytes is largely dependant upon the farmer restricting cattle use or cultivation of wetland/creek margins.

3.2.3 Aquatic Biota

The Project site is found with in the Major Watershed Division of the Morris River and smaller sub-watershed basin of the Little Morris River (Manitoba Conservation FIHCS 1992) draining to the Red River. Named water bodies adjacent to the Project site include South Tobacco Creek to the north and Shannon Creek to the south.

There are some intermittent sloughs and creeks found within the Project site however, there is little to no recorded information regarding these water bodies. The limited data available for South Tobacco and Shannon creeks indicate the possibility of fish presence in the smaller tributary creeks within the Regional study area. These water bodies likely experience annual winterkill due to their shallow and intermittent nature. In the absence of appropriate over-wintering, spawning and rearing habitat, creeks present within the Project site would be limited in their ability to support fish populations.

3.2.4 Surface Hydrology

The Project site is located within a low-lying area that possesses few water resources that are largely dependant upon storm events and spring run-off from the Pembina Hills area. Even during these events, the land has little capacity to retain surface waters. As mentioned in Section 3.2, one creek flows eastward from the Pembina Hills escarpment into the Project site.

3.2.4.1 Surface-Water Quality

No samples were taken from any surface-water body near or within the Project site for the EIA, however, it can be expected that water quality in the study are will be similar to that of local creeks. Data for rivers draining in southern Manitoba indicate presence of plant nutrients, insecticides and herbicides as a result of local agriculture (Bourne *et al.* 2002; Jones and Armstrong 2001). As indicated in Sections 2.4.1.2 and 2.6, benchmark water-quality analysis will be conducted prior to the commissioning of the proposed tannery and subsequent periodic

monitoring of the quality of water bodies near the development site will be conducted by the Colony.

3.3 TERRESTRIAL ENVIRONMENT

Most of the land within the regional study area has been altered for the production of grain, oil seed, animal feed or cattle (Smith *et al.* 1989). Native vegetation communities today exist only in remnant patches in wetlands, along drainage channels, and on steeper slopes not suitable for agriculture.

Nearly 95% of land within the Project site is under cultivation for the production of cereals, oil seeds and animal feed. Small areas of pasture also exist, as do areas of trees and shrubs. Less than 5% of the study area supports forested lands; trees and shrubs are found in mixed deciduous and oak bluffs, shelterbelts and along creek beds. Land surrounding the Project site is also predominantly agricultural, with production focused on grain and oil seed crops as well as sunflower, hay and flax.

3.3.1 Flora

Native vegetation prior to settlement in the regional study area (Aspen Parkland and Lake Manitoba Plains Ecoregion) consisted of woodland groves interspersed with prairie grasslands, wetlands, oak and aspen bluffs, with strips of woody forest vegetation along stream banks and valleys. Woodlands along slopes and valley bottoms today may contain trembling aspen (*Populus tremuloides*), white elm (*Ulmus americana*), Manitoba maple (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), balsam poplar (*Populus balsamifera*) and bur oak (*Quercus macrocarpa*) with a well-developed shrub layer consisting predominantly of hazel (*Corylus spp.*) and saskatoon (*Amelanchier spp.*; Smith *et al.* 1989). Where grasslands occur, dominant species may include spear grass (*Stipa comata*), wheat grass (*Agropyron spp.*) fescue (*Festuca spp.*) and Kentucky bluegrass (*Poa pratensis*), interspersed by a variety of herbaceous vegetation. Since settlement, much of the land has been cleared for agriculture. In some areas, native forest remains along valleys and waterways (Smith *et al.* 1989).

A number of plant species deemed of special concern to Manitoba Conservation exist within the regional study area. There are documented occurrences of approximately 107 of these plant species within the Aspen Parkland Ecoregion (Appendix D, Table D-1) and 74 plant species in the Lake Manitoba Plain Ecoregion (Appendix D, Table D-2; Manitoba Conservation 2005a). Only nine species of conservation concern have been found within the Project site (Appendix D, Table D-3).

Within the Prairie Ecozone, there are seven plant species listed as threatened or endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and/or the Manitoba Endangered Species Act (MESA) (MESA; Appendix D, Table D-4; COSEWIC 2005; Manitoba

Conservation 2005b). To date, none of the seven species of plant have been found within or adjacent to the Project site (Manitoba Conservation 2005a).

3.3.2 Fauna and Avian

Fauna common to the regional study area include coyote, badger, white-tailed jackrabbit, Richardson's ground squirrel, northern pocket gopher and white-tailed deer. A number of grassland birds are found throughout this region; typical species include Savannah and Vesper Sparrows, meadowlarks, Horned Larks and Red-winged Blackbirds (Sauer *et al.* 2003). Prairie-pothole habitat within the regional study area provide essential staging and breeding habitat for waterfowl such as geese and ducks as well as for shorebirds, herons, terns and gulls. Although no areas within the Manitou and Winkler Ecodistricts are designated as "important" for waterbirds (Poston 1990) this region does fall within the Mississippi flyway, a major migratory route for a variety of birds breeding within and north of Manitoba.

Reptiles ranging throughout the regional study area include red-sided garter snake, western plains garter snake and western painted turtle, while common amphibians include Canadian/ American toad, boreal chorus frog and wood frog (Preston 1982). Deemed a species of concern by COSEWIC, the northern leopard frog is also present throughout the region (cf. Appendix D, Table D-4; Preston 1982; COSEWIC 2005).

3.3.3 Endangered Species

The regional study area has the potential to support 16 species of wildlife listed as threatened or endangered by COSEWIC and/or MESA (Appendix D, Table D-4; COSEWIC 2005, Manitoba Conservation 2005a & b). Of these, 12 are birds, two are mammals and two are amphibian. These species have become threatened or endangered for reasons largely associated with loss of habitat. A number of birds with low or declining populations in this region have been affected by the reduction of native grassland for crop production (Carey *et al.* 2003).

Seven species of vascular plants known to have inhabited southern prairie regions of Manitoba are now considered threatened or endangered by COSEWIC and/or MESA (Appendix D; Table D-4; COSEWIC 2005; Manitoba Conservation 2005a). These include species found in disappearing grassland, wet meadow and sandy habitats.

3.4 ATMOSPHERIC ENVIRONMENT

3.4.1 Climate

The Miami Tannery Project Area falls within the Grassland Transition Ecoclimatic Region of southern Manitoba (Smith *et al.* 1998). The climate is marked by short warm summers and cold long winters with seasonal summer temperatures around 23°C (July) and mean winter

temperatures of –20 °C (January). Warmest temperatures recorded at the weather station in Carmen, Manitoba between January 2001 and 2004 (http://209.82.48.85/climate/historical.asp) were 35.2°C (August 2003) and coldest temperatures in January 2002 (-38.3°C). Overall average annual temperature is about 2.7°C. Average total precipitation annually is approximately 553 mm and wind direction is predominantly from the northwest (Smith *et al.* 1998).

3.5 SOCIO-ECONOMIC ENVIRONMENT

3.5.1 Demographics

The population of the Colony is 113 people, with a ~50/50 ratio of men to women (Hofer *pers. comm.* 2005). Children attend school within the Colony.

Dwellings within the Colony Site (cf. Figure 1-2) consist of those owned by the Colony. Within approximately 1.6 km (one mile) radius of the Colony exists four farm dwellings, the closest being 400 m directly west. Six dwellings occur within 2.4 km (1.5 miles) and about 30 occur within 6.5 km (4-mile) radius.

3.5.2 Economic Base

The economic base for the Colony is agricultural (including animal husbandry). The Rural Municipality of Thompson has one of the most modern waste-disposal facilities in Manitoba, which provides extra revenue for the area. The Village of Miami is the main service centre for the municipality, although the Cities of Morden and Winkler are also nearby, in the R.M. of Stanley.

3.5.3 Services and Utilities

3.5.3.1 Municipal Services

Law enforcers include approximately 36 RCMP that service the Miami vicinity (including the Colony Site; cf. Figure 1-2). The Village of Miami is further equipped with a 911 response team as well as a volunteer fire department.

Miami and the R.M. of Thompson are served by a new medical clinic, with three doctors and medical support staff (http://www.cici.mb.ca/miami/). Emergency services are provided by the Miami First Response Unit, a group of eight fully trained volunteer emergency medical responders (EMRs) on rotating 12-hour on-call shifts. At any time, two EMRs are available 24 hours a day, 7 days a week.

The nearest Licensed Hazardous Waste Disposal Site to the Colony Site is in Letellier, Manitoba (75 km south of Winnipeg along Hwy #75). It is operated by Miller Environmental Corporation.

3.5.3.2 Transportation Services

Transportation facilities in and around the Village of Miami, Manitoba (including the Colony Site) are restricted to railroad and freight terminal or trucking services. The closest taxi and bus service is found in Morden and/or Winnipeg.

3.5.3.3 Other Local Services

The Village of Miami boasts a number of local businesses some of which include a restaurant and lounge, grocery stores, pharmacy, gas bar, banks, Canada Post, auto services and agencies that provide investment, insurance and travel services (http://www.cici.mb.ca/miami/). An additional 25+ other businesses are located in the R.M. of Thompson.

The Colony advises that it purchases the majority of the outside goods needed from Morden or Winkler, Manitoba (Hofer *pers. comm.* 2005).

3.5.3.4 Utilities

Utilities within Rural Municipality (R.M.) of Thompson (including the Colony Site) include telephone and hydro electricity. There are no public water or municipal sewer systems to service the Colony, nor is there access to natural gas. The Colony advises that it also uses propane and coal and that it obtains all of its water needs from on-site groundwater wells (Hofer *pers. comm.* 2005).

3.5.4 Regional and Local Land Use

The R.M. of Thompson is located in south central Manitoba (http://www.community profiles.mb.ca/cgi-bin/csd/index.cgi?id=4603058). The R.M. is located in an agricultural area abundant in cereal grains and specialty crops. The R.M. specializes in crops such as canola, sunflowers, corn and beans. The Village of Miami is the centre of the municipality and it serves as a bedroom community for the larger centres of Carman, Morden and Winkler. The R.M. of Thompson is only 117 km southeast of the City of Winnipeg. Provincial Trunk Highway 23 passes through the municipality, while Provincial Road 432 links the community directly to the Town of Morden. Deerwood and Rosebank are the other significant communities in Thompson.

3.5.5 Heritage, Cultural, and Archaeological Resources

The area was settled in the 1870's and at that time the Town of Nelson (or Nelsonville), as it was called before incorporation, was the business centre for the area (http://www.communityprofiles.mb.ca/cgi-bin/csd/index.cgi?id=4603058). By 1885, Nelson had

all but disappeared as the railroad bypassed the town. With the demise of Nelson, the Village of Miami became the centre of commerce. The R.M. of Thompson was officially incorporated in 1909.

The location of the Project site is within agricultural land that has been under cultivation for many decades. Remaining intact heritage and cultural sites in the area surrounding the Colony include the Miami Pioneer Museum and the Miami Railway Station.

4.0 ENVIRONMENTAL ASSESSMENT OF POTENTIAL EFFECTS

4.1 CONSTRUCTION USE

Because a building capable of housing the proposed tannery operations (cf., layout depicted in Figure 2-3) is already present at the Colony, there will be no construction operations associated with this aspect of the proposed development and, therefore, no environmental effects. Accordingly, the following subsections address solely the effects (positive and negative) of the construction of the lined lagoon, which have been evaluated on the basis of the information provided in the Project Description (cf. Section 2) and the Existing Environment (cf. Section 3) sections of this report.

4.1.1 Hydrology and Water Quality

Initial site preparation for the lagoon will involve site clearing and excavating. These activities will require the use of backhoes, front-end loaders, bulldozers and/or graders (i.e., typical construction equipment). These activities, however, are not expected to alter the quality, rate of movement, or direction of groundwater flow.

Minimal, if any, quantities of water are anticipated to be required for construction activities and therefore the effect on groundwater reserves is considered to be insignificant.

Construction activities are not expected to create any new ditching or swales. Furthermore, the location of the lagoon precludes direct physical contact with surface waters. Since the Colony is committed to Best Construction Practices (e.g., Environmental Code of Good Practice for General Construction Environmental Protection Service 1980; cf. Section 2.4.1), adverse effects on surface-water quality are unlikely and considered insignificant. Any potential for adverse effects from a contingency event will be prevented or mitigated by the measures outlined in Section 4.3).

4.1.2 Surface Soil and Vegetation

The construction area to be cleared and excavated for the lagoon is located directly south of the Colony Site, on Colony land (cf. Figure 1-2). Based on the engineering drawings supplied to the Colony by a separate engineering contractor, the lagoon site is located three-quarters of a mile south of the Colony's hog and dairy farms (cf. Appendix A). Generally, most of the land located at the Colony site and surrounding Colony lands have been previously disturbed by human development, agriculture and animal husbandry practices. Accordingly, impacts to surface soil and vegetation from lagoon-construction activities are considered to be insignificant.

Additionally, on the basis of the construction practices committed to and outlined in Section 2.4.1, no additional soil or vegetation disturbance (i.e., outside the cleared and excavated area) is expected to be associated with construction.

Any potential for adverse effects from a contingency event will be prevented or mitigated by the measures outlined in Section 4.3).

4.1.3 Wildlife

Within the Colony Site (cf. Figure 1-2), wildlife habitat exists as wooded bluffs, a wooded stream, hayed and cultivated land. Treed areas, including those along the stream would support higher diversities of wildlife than cultivated, hayed or other disturbed land present at the site. The proposed construction of the lined lagoon on previously disturbed land will have less effect on wildlife (e.g., birds and small mammals) than would construction in higher quality wooded and riparian habitat.

Construction operations may cause short-term avoidance by wildlife due to the noise created by excavation equipment. This would have a small, temporary effect on wildlife utilizing the Colony area. The overall effects on wildlife due to construction activities are therefore expected to be minimal and not significant.

4.1.4 Air Quality

Air quality can be impacted by construction-related emissions in the form of blowing dust and vehicle emissions. Blowing dust is unavoidable during construction activities however, dust is unlikely to create local nuisance for homes within the immediate region due to the distance between the Colony and its neighbours (cf. Figure 1-2 and Section 3.5.1). Mitigation (e.g., occasional dust suppression) will be undertaken, as required, if sufficient potential for off-site nuisance occurs. With respect to vehicle emissions, vehicle exhaust containing various compounds (e.g., CO, NOx and SOx), and hydrocarbon vapours from fuelling activities will be emitted in the vicinity of the site. These emissions are anticipated to be small and of short duration. Mitigation measures will include maintenance of construction equipment such that equipment emissions do not exceed provincial Air-Quality Guidelines. Overall, the impact of vehicle emissions during construction is considered to be insignificant.

4.1.5 Hazardous Material Handling and Storage

Construction activity will involve the use of a number of petroleum products, for which impact-prevention containment and storage protocols will be established. These products could include:

- Hydraulic oil
- Gasoline

- Lubricating oil and grease
- Diesel fuel

Some of these products are already used by the Colony and are present on-site. The Colony commits to the safe storage of any new products brought on-site for construction activities. All equipment will be adequately maintained to minimize operational losses of hazardous materials and to reduce the risk of accidental spillage. The Environmental Inspector (cf. Section 2.8.1) will further maintain an inventory of these construction-related products. On this basis, no significant adverse effects of construction-related handling and storage of hazardous materials are predicted, as further discussed below.

4.1.6 Hazardous and Non-Hazardous Waste Management

The Colony will implement impact-prevention practices in the handling of hazardous and non-hazardous wastes generated by construction activities as outlined in Section 2.6.1. No production of hazardous wastes is expected to occur as a result of construction activities. Accordingly, no adverse effects are predicted to arise from construction-related management of non-hazardous or hazardous waste.

4.1.7 Security

Safety requirements may require fencing around construction installations. Fences will be greater than 1 m high orange PVC snow fencing, or equivalent, supported by metal fence posts. Access points will be secured with lockable gates, if required.

4.1.8 Nuisance

4.1.8.1 Noise

As indicated in Section 3.5.1, dwellings within the Project site consist of those owned by the Colony. The closest dwelling outside the Colony is ~400 m directly west. The R.M. of Thompson does not have a noise by-law. That being said, the Colony commits to minimizing construction-related noise as much as practicable. Construction activities will not be conducted late into the evening when noise nuisance would be most audible. The Colony will require that all vehicles and internal combustion engines be equipped with functional mufflers as recommended by the manufacturers of that equipment.

4.1.8.2 Odour

Because no odours are expected to be associated with any of the phases of construction, no related impacts are expected.

4.1.8.3 Light

No construction activities will be conducted late in the evening (cf. Section 4.1.9.1). Accordingly, minimal outdoor lighting during construction is anticipated (e.g., for security purposes only). Accordingly, no construction-related lighting impacts are predicted.

4.1.8.4 Vibration

Some localized ground vibration will likely be noticeable during excavation. Ground vibration is not expected to cause structural damage or impair groundwater quality. Accordingly, no significant adverse effects of construction-related vibration are anticipated.

4.1.9 Traffic

Any required materials for the construction of the lagoon will be transported to the facility by the Colony or by supply truck. Truck traffic to the site during construction is expected to increase only to a very minor degree as a result. The types of vehicles associated with the construction of the lined lagoon are typical for the activities being conducted and would remain on site until construction activities are completed. No significant adverse effects on traffic are therefore anticipated.

4.1.10 Site Cleanup

The Colony will ensure that the site is free of construction-related litter and debris at all times (cf. Section 2.6.1). Waste material will be removed on a regular basis and disposed of at appropriate facilities (i.e., either to the landfill in Miami, Manitoba or, if hazardous, to a Hazardous Waste Disposal Site [Miller Environmental Corporation]).

4.1.11 Economic Effects

Construction of the lined lagoon are expected to constitute an investment of approximately $400 000. This investment will create some positive effects for the construction labour force and material suppliers in the surrounding rural communities.

4.2 OPERATIONAL PHASE

Effects (positive and negative) of normal operations of the proposed tannery and lined lagoon have been evaluated on the basis of the information provided in the Project Description (cf. Section 2) and the Existing Environment (cf. Section 3) of this report. The effects and their significance are discussed in the following subsections.

4.2.1 Hydrology

As indicated in Section 2.2.4, the water required for site operations (~12,000 L/batch or ~600,000 L/processing season; cf. Section 2.3 and Figure 2-2) will be obtained directly from groundwater wells already installed on the Colony land (i.e., water will not be treated/softened prior to use). As indicated in Sections 2.7, 2.4.1.2 and 2.6, the appointed Environmental Inspector for the proposed development will periodically monitor area groundwater and surface-water quality during normal operations and compare it to benchmark data collected prior to system commissioning. On-site monitoring records will be maintained by the Environmental Inspector.

On the basis of the above, effects on hydrology from normal tannery operations are expected to be insignificant. The effects of the liquid wastes from normal tannery operations on surface- and subsurface-water quality are evaluated in Section 4.2.6.1.

4.2.2 Surface Soil and Vegetation

As indicated in Section 2.5, the following wastes from tannery operations will be spread on Colony agricultural lands:

- Chrome-free, 100% organic hide material solid waste (cf. S-1 waste stream, Section 2.4.2.2), which has been co-composted on site by the Colony with animal-husbandry solid wastes and wood shavings (an existing composting operation).
- Accumulated sludge (in slurry form) from the lined lagoon.

Bench-scale testing conducted on a 60-hides "sample batch" in March 2006 (cf. Section 2.4.2 and Appendix B) indicates that the chromium (0.3 ppm) and salt (315 ppm) concentrations that will be present in the tannery sludge will be amenable to this practice, especially given the Colony's large, 4,400-acre land base available for the application. Further dilution of Cr^{+3} will occur following tannery waste discharge into the lined lagoon. Between October and March, tannery waste will combine with and be diluted by, at minimum 6 months of accumulated livestock manure waste (approximately four million litres).

The behaviour of chromium in soils is governed in part by soil pH. Generally, the adsorption of Cr^{+3} to clay particles increases with increasing soil pH (approximately pH 8.5). Trivalent chromium has low solubility in soils when compared to the highly soluble hexavalent chromium, Cr^{+6} (soluble at most pH levels; USEPA 2006). Given the low solubility of Cr^{+3} in soils and its strong retention on soil surfaces, the bioavailability and mobility of Cr^{+3} in soils and waters is limited (ANRCP 1998). Not only does Cr^{+3} have poor permeability in plant tissue and passive uptake by plants, it is considered non-corrosive or non-toxic to plants (ANRCP 1998).

Since the application of tannery waste would also be in conjunction with the current manure application activity, no additional effect on surface soil density (due to compaction caused by heavy equipment) is anticipated.

On the basis of the above, impacts to surface soil and vegetation as a result of the proposed development, are considered to be insignificant.

4.2.3 Wildlife

The proposed tannery development will be situated on previously disturbed land that supports little wildlife habitat. Accordingly, the effects on wildlife due to normal operations are expected to be insignificant.

4.2.4 Air Quality

Tannery emissions during normal operations will consist of trace amounts (less than 5 ppm) of hydrogen sulfide (H_2S) and ammonia gas emitted approximately 6 to 8 hours/week during the tanning process (specifically the unhairing and de-liming processes; cf. Figure 2-2 and Section 2.4.2.3). It is important to note that no nuisance odours were reported by Tannery Run Sales to have been detectable during the bench-scale testing conducted in March 2006. Further, air-quality was never an issue for Dominion Tanners (Winnipeg or Edmonton operations), which was a substantially larger operation than that proposed for the Colony and located adjacent to a densely populated urban community (B. McConnell *pers. comm.* 2006).

Manitoba's air-quality guidelines (Manitoba Conservation 1999) for these parameters are as follows:

- For H_2S: 15 micrograms per cubic metre (11 parts per billion [ppb]) for a 1-hour average and 5 micrograms per cubic metre (4 ppb) for a 24-hour average.
- For ammonia gas: 1.4 micrograms per cubic metre (2 parts per billion [ppb]) for a 1-hour average.

Periodic testing, using a hand-held H_2S monitor, will be conducted by the Environmental Inspector (cf. Section 2.8.1) to monitor facility and surrounding air quality to ensure lack of nuisance. More elaborate emissions testing during normal operations is not expected to be conducted unless such operations appear to be resulting in nuisance-odour conditions for the Colony's residents or neighbours (i.e., complaints are received).

Although the lagoon may still produce some organic odour, it is not anticipated to be of nuisance to Colony residents or off-site neighbours, given the animal-husbandry odours prevalent on the site. Dispersion of odour is largely dependant upon weather conditions. Prevailing winds (north and west) would lessen the effect of any odour on the closest neighbour

to the colony (<1 km west of the colony site; cf. Section 3.5.1). The seasonality of operations is anticipated to preclude any complaints of nuisance odours as operations will be occurring during the times of the year when outdoor-area agricultural and recreational activities are minimal.

Although additional odours could result from the inclusion of tannery waste into the current operation of spreading livestock manure on agricultural fields, a notable increase in odour is not anticipated. The Colony residents and Colony neighbours currently practice land application of livestock waste on agricultural soils within the surrounding area. Spreading of mixed waste (lagoon slurry) will adhere to the Manure Management Regulation, and thus will occur in the spring or more typically in the fall, when other farmers are actively fertilizing their fields with livestock manure.

Impacts on local air quality during normal operations is therefore not considered to be significant.

4.2.5 Hazardous Materials Handling

The tannery process requires the use of acidic and caustic chemicals. These include, but are not restricted to:

- Sulphuric acid
- Sodium hydroxide
- Chromium
- Formate

Exposure to these chemicals occurs during mixing processes (e.g., vapours emanating from tanning vats) and during waste disposal. The Environmental Inspector will be responsible for training workers on the safe handling of chemicals used on site (cf. Section 2.8.1). By training and monitoring the ongoing tannery operations, the Environmental Inspector will ensure workers are adhering to safe plant procedures. Accordingly, the effects of normal tannery operations on worker safety will be insignificant.

4.2.6 Waste Management

4.2.6.1 Liquid Wastes

Tanneries require substantial amounts of water for hide processing (up to 2 million litres per day [B. McConnell *pers. comm.* 2005]). As indicated in Section 4.2.1, the proposed development will require approximately 12,000 L of water per batch of 200 hides, resulting in a total consumption of only ~600,000 L of water per processing season (i.e., October to March); a comparatively small amount of water. The majority of the wastewater (i.e., all waste streams except L-5 and L-6; for a total of ~11,700 L per batch of 200 hides; cf. Figure 2-2) will recruit

to the lined lagoon and will likely contain organic material, a variety of organic and inorganic chemicals used in tannery processes (cf. Table 2-2), and traces of non-reactive chromium and salt. On the basis of the Project Description (cf. Section 2) and March 2006 bench-scale testing (cf. Section 2.4.2.1 and Appendix B), the chromium-removal during the tanning process will be ~99.99% efficient resulting in ~0.01% (or 3.35 kg) of chromium (per processing season [i.e., October to March]) entering the lined lagoon. The quantity of total sodium that will enter the lined lagoon is estimated to be about 2,700 kg (per processing season [i.e., October to March]). The design of, and construction technique for, the lined lagoon (cf. Section 2.2.5) will prevent contaminants from impacting soil and groundwater quality (cf. Section 4.2.3).

Through proper transfer and storage of wastewater, no significant effects on surface (e.g., creek) and/or groundwater quality are anticipated. The Environmental Inspector for the proposed facility will further regularly monitor raw-water quality entering, and effluent exiting, the lagoon, as well as area groundwater and surface-water quality to confirm lagoon integrity and environmental compliance (cf. Section 2.8.1).

Tannery effluent entering the lined lagoon will be greatly diluted by livestock manure waste (up to a maximum of 37.8 million litres or 10 million gallons). Not only will the dilution of tannery waste with manure further decrease the concentrations in which trivalent chromium and salt are added to soil, but the organic matter-rich livestock manure provides greater adsorption opportunities for both Cr^{+3} and salt. Monitoring of nutrients, heavy metals and salt content in both the lagoon slurry and soils that would receive the lagoon slurry, will occur at minimum twice annually. If, following the Colony/Manitoba Conservation review of monitoring results from two complete years of tannery/livestock waste mixing and land application, the Department deems the separation of wastes to be necessary, the Colony proposes to add on an extra cell to the lagoon for the separate storage of tannery waste.

4.2.6.2 Solid Wastes

The non-hazardous solid waste (i.e., waste stream S-1; cf. Section 2.4.2.2), consisting of 100% organic hide material and totalling approximately 9,050 kg (cf. Figure 2-2) over the entire processing season (i.e., October to March), will be co-composted in the Colony's existing composting system and then applied to the Colony's agricultural land as fertilizer, as discussed in Section 4.2.2. Following appropriate fertilizer application guidelines, this fertilizer is expected to have a positive effect on soil-nutrient availability and a small occasional effect on air-quality (cf. Section 4.2.4). The Environmental Inspector for the proposed facility will ensure proper land application of this fertilizer and will conduct periodic testing of the agricultural soils receiving such amendments (cf. Section 2.8.1).

The hazardous solid-waste material (i.e., waste stream S-2; cf. Section 2.4.2.2) consisting of the blue shavings containing ~2-3% chromium oxide and totalling 4,530 kg (wet weight) over the processing season (i.e., October to March; cf. Figure 2-2) will be collected and drummed