

**Review of Waste Management Options for Fur Farming
in Newfoundland and Labrador**

FINAL REPORT

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Preface

This report is filed under the provisions of a research contract entitled “Review of Options for Fur-Farm Locations and Operations in Newfoundland and Labrador.” Under the terms of the contract, we delivered the following reports to the Centre for Environmental Excellence, Grenfell College, and the NL Department of Natural Resources, Agrifoods Branch:

1. a progress report for 31 May 2007, including findings from our literature review and an annotated bibliography;
2. an interim report for 31 August 2007, integrating findings from the field with those from the literature, and including preliminary recommendations; and
3. a final report (this one), incorporating feedback from fur-farming stakeholders in NL and accompanied by an updated bibliography.

The field research team - Ryan and Keith - extend a warm thank you to Hazen Scarth and Krista Bradley for their help and cooperation over the summer. The team also acknowledges the able assistance of the province's mink ranchers, the Newfoundland and Labrador Fur Breeders Association, the Newfoundland and Labrador Federation of Agriculture, the Agrifoods Branch of the Department of Natural Resources, the Environmental Assessment and Land Management divisions of the Department of Environment and Conservation, and Jeff Whalen and Len Moores.

While Keith and Ryan were newcomers to Newfoundland and Labrador last summer, I have been working with forest-sector and environmental-assessment people in the province for some 15 years. This project marks a transition for me with a chance to work with the people of Newfoundland and Labrador in the agriculture sector. As expected, agricultural people in the province have extended to us the same welcoming hospitality and generosity of insight as I have become used to in forest and environmental work. On a personal note, I extend my warmest appreciation to Len Moores, Chief Executive Officer of the Forestry and Agrifoods Agency, Department of Natural Resources, for making this project possible.

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1.0 Introduction

The use of animal furs for clothing is a long-standing practice in human history. In Canada, this practice has edged its way into the heritage and traditions of the country. From various First Nations groups to the famous fur trade, it now continues with small-time trappers and fur farms which provide pelts for the contemporary fashion industry. Canada and Russia were the first countries to start breeding fur-bearing animals (Joergensen, 1985: 11). A legacy of fur harvesting and use continues to this day, placing Canada as one of the top ten fur-producing countries in the world (Fur Commission USA, 2006). To meet the growing demand for fur, mink (*Mustela vison*) is among the species now farmed for fur. In 2006, Canada accounted for 4.5% of global mink fur production (Fur Commission USA, 2006).

To capitalize on the growth in this industry, the Government of Newfoundland and Labrador (NL) intends to foster mink farming in the province (H. Scarth, 2007, pers. comm.). Over the past few years, the economic benefits of mink in NL include the creation of 100 full-time and 300 part-time jobs as well as the sale of 160,000 pelts in 2006 with an estimated value of \$10 million (H. Scarth, 2007, pers. comm.). Furthermore, “the industry requirement for feed stock has provided a market for offal from the fishing industry, spent chickens from poultry farms and other products from the food industry” (H. Scarth, 2007, pers. comm.). Projections for the industry state that gross sales could approach \$50 million over the next few years (H. Scarth, 2007, pers. comm.).

Unfortunately, some negative environmental impacts are associated with expansion of the industry. Currently in the province, two issues are of particular concern: flies and odours. While new installations are being constructed and operated in compliance with applicable regulations and guidelines, there have been issues with respect to nuisance to neighbours. For instance, there has been considerable debate about the establishment of a mink farm in Portugal Cove -St. Phillips as well as a complaint about flies associated with Viking Fur Inc. near Cavendish. The latter has resulted in a hearing by the Farm Practices Review Board which concluded that the farm was operating according to reasonable farm practices.

Due to these socio-political tensions, the Government of NL commissioned a review of options for waste management on fur farms (see Appendix 1). This final report reviews and analyzes the findings of our field research. The first section details the preliminary

findings including odour management, fly management, waste management, carcass disposal and minimum separation distances (MSDs). The second portion of the report transforms the findings into preliminary recommendations for the fur farming industry as they pertain to industry needs and to the above components with due consideration for the socio-economic, geographical, meteorological and other site-specific conditions in NL.

2.0 Methods

The field component of the study was carried out on the island of Newfoundland with particular interest on the east and west coasts where the majority of the fur breeders are located. Over the course of the two-month field period (June-July 2007), the research team visited six mink farms. On a majority of the farms visited, comprehensive investigation was conducted. This included speaking with the owner/manager of the farm regarding manure management practices, carcass disposal methods, feeding practices, facility design, animal housing, and pest management while having an escorted tour of the facilities. Photographic records of specific farm practices were made with permission of the farm owner.

The research team also held consultations with a number of individuals in the Government of NL. Specifically, the contacts were members of the Agrifoods Branch of the NL Department of Natural Resources, and the Environmental Assessment Division, Land Management Division and Pollution Prevention Division of the NL Department of Environment and Conservation (DOEC). Informal discussions were conducted with the various contacts regarding the mink industry in general, the issues surrounding mink farming in NL, and the specific issues of mink farming from the perspective of each person consulted. Furthermore, contacts within the NL fur industry were developed to ascertain their specific perspectives on the mink farming industry. This was useful to inform us of their current practices and future plans and to help us better understand the mink farming practices in the province.

Upon completion of the field work, the research team completed this second report to outline the initial findings from the two-month field season, to further shape recommendations made in the first report (Review of Waste Management Options for Fur Farming in Newfoundland and Labrador—May 25, 2007) and to develop new recommendations for the NL fur farming industry.

Findings

The mercurial rise of mink farming in NL, from 1000 breeders in 2001 to 60,000 breeders in 2007, shows that in a transnational industry, location and geography do still matter. In NL, the mink industry has become part of an integration of various commodity groups and collaborations occurring between various producers (Wiseman, 2007).

2.1 Land use planning

The strategic placement of mink farms to benefit from the aforementioned integration has resulted in direct sales estimated at \$17 million and an industry value of \$38 million. Issues associated with land use, however, have placed mink farmers in direct confrontation with other land users.

Land use planning is a process of organizing the use of land and resources to best meet people's needs (Beazley, 2007). Historically, the Government of NL set aside twenty (20) Agricultural Development Areas (ADAs) under the Lands Act (Province of NL, 1991), two of which are now gazetted. These are based on soil surveys and were intended for root crops and forage areas (Agrifoods Branch, n.d.). While residential encroachment near these areas is blamed for the land-use conflicts, the issue is far more complex and involves the farmers and government as well. The agricultural Crown-land leasing policy, the land consolidation program¹ and the property tax exemption program² represent important initiatives in effective agricultural planning in NL (Ricketts, 2007). Farmers, however, have suggested that these are resulting in a lack of consistent support for appropriate land use (Wiseman, 2007) and they do not address land use policy outside planning areas and on private land.

¹ The program was implemented in 1985 (expanded in 2005) for the purposes of providing an opportunity for non-farm landowners and retiring farmers to sell their land, zoned as agricultural, to the province.

² This exempts farmers and landowners from municipal taxes.



Figure 1 - Mink farm with community.

Consequences of multiple competing land uses are clearly identified as a problem. In broad terms, this causes “pressures on agricultural land and water, with impacts to productivity and socio-economic viability of agriculture” and causes “cumulative and incremental effects on the landscape, water, watersheds and natural ecosystems, with impacts to ecological, life-support system, and socio-economic sustainability” (Beazley, 2007).

Like most industries involving confined-animal rearing, fur farming is distinguished from conventional agriculture as it does not require particularly arable land. Mink farms do not need to be in ADAs and can be developed on any Crown-land lease or private land. However an adequate land-base is still required for spreading of manure. This highlights the source of conflict and underscores the importance of proper land-use planning.

Pre-approved fur ranching locations on Fox Farm Road near Cavendish and the eastern side of the Bay D’Espoir Highway were rejected as suitable locations for large-scale farming. This decision was made during the Collaborative Expansion Consultations with the addendum that the close proximity (2 hectares or 5 acre lots) of the sites poses a biosecurity risk (Agrifoods Development Branch, 2007b: 6). The current presence of Aleutian Disease

(AD) in the province serves well to remind one of the importance of proper land-use planning beyond simply mitigating issues of flies and odours.

3.2 Site selection

Site selection is an important component of mink farming, in particular the mitigation of environmentally and socially harmful effects including flies and odours. According to Agriculture Canada (1988: 6), “local environmental conditions, foreseeable neighbourhood development, and subsequent anticipated farm growth” should be of particular concern when siting mink farms. The pace of the industry’s expansion in NL has indeed been rapid and this has challenged the land-use planning process associated with siting decisions. Again, this is not to say that site selection has been poor in the province, but site locations appear to rely mainly on proximity to suitable energy sources, access roads³, and a willing workforce, and transportation distances for fish offal and waste disposal.

Rapid industry expansion has resulted in a procedural distinction between established-and-expanding farms versus proposed new mink farms. Existing farms that were established without regulation are not subject to the interim rules governing MSDs. For established producers, this would have made expansion infeasible due to the proximity of current neighbours. Currently farmers with <10,000 breeders are restricted to a MSD of 800 m while farmers with >10,000 breeders are restricted to 1,400 m (Agrifoods Development Branch, 2007b).⁴ Smaller operations that may otherwise produce no offending externalities are now subject to the same geographical limitations as larger fur producers.

Our site visits and GIS data show that current farms comply with this cautious MSD guideline. Self-protection considerations due to proximity of neighbours are of particular concern especially when considering the current official complaint arising from fly disturbances (Moore, 2007). The lack of defined jurisdiction over buffer zones on agricultural leases and the subsequent growth of residential areas are identified as barriers to site selection of new farms and growth of current farms.

Another important variable in site selection is access to land for manure disposal. Current guidelines recommend 0.4 hectares (one acre) of suitable spreading land per 150

³ This includes year-round road access, the high costs of building roads and running power lines, and snow clearing (Moore, 2007).

⁴ Farmers operating with less than five animal units (AU) are exempt from the Certificate of Approval process which likely exempts them from MSDs as well (Agrifoods Development Branch, 2007).

animals (Moore, 2007). This translates into one animal unit (AU) per 0.4 hectares (one acre) of land. If a farmer does not have a suitable land base, firm commitments from another farmer or landowner must be stated in the Certificate of Approval to spread manure there (Moore, 2007). Currently all farmers purportedly have the land base or other agreements to account for all manure produced on the farms. There appears to be a consensus that there is a deficit of available land for manure application in NL (Thompson, 2007).

3.3 Current site conditions

3.3.1 Barn design

Barn design is critical in fly and odour control. Mink sheds in NL have a fairly consistent design. The sheds are built on packed dirt floors and are generally long and narrow (ca. 50-100 m) with 4 to 6 rows of mink cages inside. The sheds are framed out of wood and covered with siding. The roofs often have air vents and the bottom quarter of the walls is either open or screened to facilitate air circulation in warmer months. During colder months, the bottom quarters are covered with aluminium panels or clear plastic tarp to prevent drafts. The manure is removed on a bi-weekly basis and the floors are limed after removal to help prevent leaching. Detailed description of the various aspects of barn design, as observed, will follow.



Figure 2 - Typical mink shed outdoors.



Figure 3 - Typical mink shed indoors.

Multi-row barns

At all the farms we visited, multi-row barns are being used for mink housing. The barns are often arranged side by side on the farmland itself. The layout of the barns is conducive to efficient feeding, watering and manure removal. However, because of the large number of animals housed in close proximity, fly and odour issues could be a problem if manure is not removed on a regular basis. Furthermore, the size of the barns makes hand removal of manure solids time-consuming and inefficient.

Dirt floors

The type of flooring used on a mink farm directly influences the overall cleanliness of the facility, health of the herd, and the effect of mink manure on the immediate and surrounding environment. On all farms in NL, farmers are constructing mink sheds on packed earth and storing manure on packed earth or on a grassed field. The use of earthen floors could potentially lead to inefficient and/or incomplete manure removal from sheds as well as contribute to poor drainage. An increase in standing water in the sheds could also potentially lead to seepage of untreated farm effluent into groundwater. In particular, the incomplete removal of manure from sheds and an increase in standing water on farms both lead to potential fly and odour problems (van Oirschot, 2007).

Specific practices are being employed to help thwart potential fly and odour problems as well as stop seepage while using earthen floors. On a number of the farms, the ground is regularly limed to help prevent seepage of waste liquid effluent into the earthen floors and reduce the amount of standing water in the mink sheds. This is pursuant to section 3.4 of the Environmental Best Management Practices (BMPs) for Mink Production in Newfoundland and Labrador (Agrifoods Development Branch, 2007a), which states that: “Hydrated lime should be applied underneath the cages on a regular basis.”

3.3.2 Cage design

False bottoms are inserted into mink cages to ensure the health and safety of newborn kits. The false bottom is a sheet of fine screening which is inserted over the larger-holed screen floors of the cages to facilitate injury-free movement around the cages by the mink kits. With the false bottoms in the cages, however, mink feces do not as easily pass through

the bottom of the cage to the floor underneath. This leads to an accumulation of manure inside the mink cages, which could create a potential for fly-breeding within the cages.

3.3.3 Landscaping

The design and layout of a mink farm play a large role in the overall health of the farm and help to limit negative public perception of the farm. The use of modern buildings and good landscaping techniques will help a mink farm build community rapport as well as minimize impacts on the land base the farm occupies.

On some of the farms in the province, there is little or no natural forest between the farm site and public roads. In fact, certain farms are located along major highways or town roads. This presents a problem when trying to minimize negative public perception and disperse odours using trees, shrubs and other vegetation.

Another way to help improve the overall health and aesthetics of the farm is to revegetate any land that has been disturbed during construction and/or everyday farming practices. On many farms in the province, minimal effort is currently made to level and revegetate areas that have been disturbed during construction and operation. Furthermore, little or no grass was observed between mink sheds to help stabilize the ground and filter runoff. Rather, the ground has been left barren.

3.3.4 Carcass disposal

The proper disposal of carcasses is necessary for effective fly and odour management issues on a mink farm. Several methods exist to dispose of mink carcasses in an environmentally and socially friendly manner. The four most common methods of carcass disposal are burial, incineration, rendering for feed, and composting (Morrow, 2001). In NL, mink carcasses are currently being disposed of by burial and composting.

Currently, it appears that the majority of the farms are burying their carcasses in landfills. This process, easy as it may be, has a number of negative consequences including securing landfill space and permission to dispose of the carcasses, a lack of potential added value to the carcass, and a variety of environmental consequences.



Figure 4 - Mink carcass compost piles.

Due to the negative attributes associated with large-scale burial of carcasses, and the overall trend in the province to reduce landfilling, the mink industry, under the direction of the Agrifoods Branch, is beginning to explore the idea of large-scale carcass composting. Currently, pilot studies on the feasibility of carcass composting are being carried out on two farms. Both projects are in their second year of study and appear to be proceeding well. Furthermore, the province is updating the Certificates of Approval for fur farms so that all carcasses will have to be composted in the future.



Figure 5 - Auger cleaning floor of mink shed.



Figure 6 - Recently clean mink shed floor.

3.3.5 Bi-weekly auger cleanup

The removal of manure from mink sheds is an important component of controlling fly and odour problems. In NL, manure is being removed from mink sheds via one of two methods. The first method, rather low-tech, involves farm employees physically removing manure with the use of shovels and wheelbarrows. This manure removal system is dated and appropriate for use only on small-scale farms due to the vast amount of time required for complete manure removal from the sheds. On larger farms, hand removal of mink manure is inefficient and either requires a vast amount of time or the employment of numerous labourers to carry out the process.

The second type of manure removal system makes use of a small tractor with an auger attachment. This system is thorough, efficient and the most appropriate and only feasible option for manure removal on large, industrial-scale mink farms with dirt floors. Currently the manure is being removed on a biweekly basis. This activity is the result of the development of Best Management Practices in the winter of 2007.

3.3.6 Manure storage



Figure 7 - Tarped manure and wood chaff.

How manure is stored on the farm is a key consideration for fly and odour management. Proper storage of the manure will produce few flies and little noxious odour. Improper storage produces the opposite: a large fly problem with strong noxious odour.

On the farms visited, manure was generally stored outdoors on cleared land. However, some farms were storing manure indoors in a manure storage facility. The manure was either covered with a tarp to reduce fly-breeding activity or left in untarped piles. On two of the farms, composting of the manure in windrows or bins was taking place to control fly breeding and odours.

3.3.7 Secondary fly control

Secondary fly control is the use of physical and chemical methods and products to control fly breeding and population density. It should be included in any pest management program for a fur farm. Chemical and physical fly controls should never be the primary method to control fly populations in an agricultural setting. Rather they should be used in conjunction with a good manure management strategy. On the majority of fur farms in the province, use of secondary fly control did not appear to be a priority for farmers despite its usefulness in controlling fly breeding.

Physical fly control

On most farms visited, physical secondary fly control methods such as tarping manure piles were in place. The use of tarps over manure piles to thwart egg-laying and facilitate quick drying of manure piles (thus killing any developing fly larvae) is one effective method of secondary fly control (Randall, 2005). However, the maintenance of these piles appeared suspect. Often the tarps were only partially covering the piles and/or the tarps had come loose, presumably due to wind. The use of tires was observed on a number of the farms as a means to hold down tarps on manure piles. For tarping to be effective, the entire pile must stay covered, so the pile needs to be observed and maintained on a regular basis. The use of screening and blacklight bug zappers was not observed on any of the farms.

Chemical fly control

Use of insecticides to control nuisance flies is valuable but they should never be solely relied upon to control fly populations (Lyon, 1995; Randall, 2005). Rather, chemical control of flies should be used in conjunction with physical fly control and proper waste management, as flies can quickly become resistant to insecticides through avoidance behaviour and detoxification mechanisms (Rogers and Collett, 2003).

On most farms in NL, however, the use of chemical fly control methods seems only to be beginning to find a place. On a small percentage of the farms, farmers are spraying pesticides onto the barns to control flies. Additionally, baited jug traps are being hung within the mink sheds and around the farm property to attract errant flies.



Figure 8 - Baited fly trap.

3.3.9 Odours

During the site visits, we paid particular attention to odours. No unreasonable smells were present near the periphery of the farms nor on the farms themselves. This may be partly due to NL's unseasonably cool weather for June and some of July. Occasionally some barns

had strong ammonia vapours as a result of agitated manure mostly due to cleaning. This, however, did not seem to venture beyond the walls of the barns.

One comment made by farmers was that odours occasionally arose due to spreading of manure. This was likely to occur if spreading was done during inappropriate times; for instance, calm humid days should be avoided (Farm Practices Guidelines Project, 2001: 44). We were assured that spreading is being done to mitigate odour issues and some recommendations are made in Section 4 below.

3.4 Socio-political dimensions

3.4.1 Monitoring and enforcement

Currently the Agrifoods Branch provides extension services to mink farmers. The Agrifoods Development Officers “are located throughout eight agriculture offices across [NL] and are the first line of contact with new and established agribusinesses” (Ricketts, 2004: 53). The responsibility of the extension officers is to “provide delivery, interpretation, and recommendation on various agricultural initiatives and programs, and professional and technical advice on new technology, production practices, and crop and livestock management to farmers. They are responsible for the identification, co-ordination, and development of agricultural opportunities on an individual farm and regional basis” (Ricketts, 2004: 53).

What this means is that there is a gap between the offered extension services and the absent but requisite monitoring and enforcement responsibilities. Due to the divergent tasks of each, the development officer cannot perform both tasks. There is an identified conflict of interest for agriculture representatives; one cannot expect an extension officer to provide assistance and recommendations on compliance while simultaneously issuing a fine. Due to the overall lack of enforcement of waste management practices, mink farming has become what some consider a non-controlled industry. This has led to community wariness and a tension between farmers and their neighbours.

3.4.2 Community rapport

There is currently an adversarial relationship between members of certain communities and the mink farming industry. Nuisance complaints have arisen from fly

problems and there are concerns about odours from farms as well. These aspects may negatively affect the quality of life of neighbours and may, in some instances, affect the success of local businesses. This has given rise to tensions not only between farmers and their neighbours but also among community members.

Conversely, mink farmers feel their industry provides welcome full-time and part-time employment to community members and a sense of hope to rural communities. Indeed, commercial fur farms do stimulate local economies (H. Scarth, 2007, pers. comm.). Farmers, however, identify a barrier to site location and operation as being the disconnection, the unfamiliarity, and the intolerance of the population to the agricultural industry. Such perspectives threaten to have farm employees pitted against their neighbours as a result of the current stigmas and allegations against fur farms. Legal class action due to fly and odour nuisance issues should be avoided at all costs.

Furthermore, we found that while fur farming has never gained a significant amount of public respect in the province, community members blame government as much as, if not more than, the farmers for allowing the industry to grow too large too quickly. This is similar to the collapse of the cod fishery, where government was blamed more than the fishing industry (CBC, 2002). This amounts to a significant erosion of credibility and respect for government which reflects poorly on its performance.

3.5 Current government initiatives

3.5.1 Fly monitoring project

The Agrifoods Branch has begun a pilot fly-monitoring study on three of the larger farms in NL. In the future all farms will be required to participate in a fly monitoring program as per updates to the Certificate of Approval. The study is currently budgeted for one year but the Agrifoods Branch hopes that the study will receive funding for a full 3-5 years (Agrifoods Development Branch, 2007a). It aims to determine the species diversity and abundance of the filth flies found on mink farms through weekly monitoring of fly populations on the farms. On the farms, sticky tapes and fly spot cards were placed within the mink sheds and collected weekly by Agrifoods employees (Agrifoods Development Branch, 2007a).

Specifically, the study intends to assess the extent of the nuisance filth flies on the mink farms, “to reduce pest populations on and off site,” “to determine the seasonality of the fly species that are present in the area and the time of year that the populations spike,” and finally to determine “economic thresholds that can be established from the card number that reflects complaint response” (Agrifoods Development Branch, 2007a). The study is modeled after a similar study by Dr. Tim Lysk of the University of Alberta on poultry farms. Dr. Lysk is involved in the study as a collaborator. Representatives from the Agrifoods Branch as well as Dr. Lysk will assess the results of this year’s fly monitoring data in the near future.

3.5.2 Experimental composting of mink carcasses

Due to the current growth of the mink industry in NL, concerns have arisen regarding the disposal of mink carcasses after pelting. In response to these concerns, the Agrifoods Branch has begun a pilot study to assess the feasibility of large-scale carcass composting as an efficient and environmentally sound method of disposing of the animal remains. In the fall of 2005, Government Services Centre (GSC), DOEC, and Department of Natural Resources all agreed to require farms to compost mink carcasses.

The composting pilot project consists of a comparison of bin and windrow composting systems on two farms. At NuMink Inc. and Viking Fur Inc., both composting systems were installed and are being closely monitored by both farm and Agrifoods staff. Approximately 1000 carcasses were composted through each means on each site over a period of four months in 2006 with one scheduled turning. Currently, large-scale carcass composting is pending approval by DOEC.

3.5.3 Experimental composting of mink manure

Much like carcass disposal, “composting has been identified by the Province as an environmentally acceptable alternative which converts manure into a stable product which is odourless and pathogen free” (NL Livestock Council et al., 2007). Furthermore, composting manure, rather than stockpiling, is seen as an important “aspect of a fly management program” (NL Livestock Council et al., 2007).

Currently, DOEC “has introduced policy which is directing mink farmers towards mandatory composting of mink manure. The Department is approaching this aim in a phased

approach, allowing time for farmers to implement manure composting over an appropriate period of time” (NL Livestock Council et al., 2007).

3.0 Recommendations

After reviewing a representative farm sample of the mink industry in NL and comparing it to other industrial settings, we have developed some areas of improvement for land-use planning and best management practices (BMPs). The following recommendations are to complement or update existing BMPs as per the following documents: Environmental BMPs for Mink Production in Newfoundland and Labrador, 2007 (Agrifoods Development Branch, 2007a); Environmental Farm Practices Guidelines for Livestock Producers in Newfoundland and Labrador, 2001 (Farm Practices Guidelines Project, 2001). Since the existing BMPs document was produced to address many fly and odour problems, we have added to and refined its recommendations.

4.1 Land-use planning

Land-use planning is an important tool for addressing and resolving issues of multiple competing land uses. This will minimize fly and odour problems by considering conflicting perspectives on local and regional land use. In NL, 0.9% of land is suitable for agriculture and much of this is owned by non-farming interests (Wiseman, 2007). Identified zones of arable, fertile or otherwise suitable agricultural land are at a premium in the province and should not be used for fur-farming purposes.

An integrated land-use plan takes into consideration competing land uses. A cost-benefit analysis may be included in the Certificate of Approval or the Environmental Assessment process to determine adverse effects to communities and operations based on other economic activities in an area. For example, tourism provides significant revenue for the province and its various communities. Tourism establishments need not be incompatible with mink ranches; a proper land-use plan can help mitigate the adverse effects of flies and odours associated with mink farms. We identify effective communication and cooperation between various jurisdictional levels as being a constraint to land-use planning.

- *We recommend the consolidation of existing institutional structures.*

The underlying feature of an integrated land-use plan is the cooperation and synergistic relationship among various government departments and stakeholders. In the mink farming industry, municipal considerations are duplicated in the EA process and in the Certificate of Approval. A more cohesive structure can transcend the industry including the integration of environmental permitting which will streamline the current system to be more efficient and responsive (see Section 4.3).

4.2 Siting Policy

The review of farm locations and proximities has indicated the influence of human resources on farm siting. It is clear that “commuting distance for workers, site security, logistics, supplies, feed, etc. necessitate locations near communities” (Agrifoods Branch, 2007: 15). The latter necessitates a clearly articulated siting policy. This should include the following components:

4.2.1 Critical site assessment

From a review of other jurisdictions, it appears that site standards are quite similar. Variables that must be accounted for are efficient drainage, adequate land base, land-use zones, separation distances and ecologically sensitive features such as waterways. Most of these are accounted for in the Environmental Certificate of Approval. An inventory of adequate land base to handle the amount of manure produced on the farm should incorporate specific details (where land base is inadequate, a letter of surety is now required). There is an algorithm in the Farm Practices Guidelines 2001 for calculating the amount of land necessary. Ensuring appropriate land holdings of farmers also ensures proper manure and/or compost management. This is both environmentally sound and responsible for managing flies and odours.

- *We recommend that socio-economic considerations be included in the Certificate of Approval.*

While mink farming does stimulate the local economies, tourism and service industries may be severely affected by the presence of flies and odours. Rather than viewing this as an onerous barrier to reasonable business ventures, this is an opportunity to plan ahead and address worst case scenarios before they happen. Due consideration should appear in the

Certificate of Approval and indicate how areas of concern will be addressed. These may well be covered in the recommended Pest Management Plan and Odour Management Plan (4.4.4 and 4.4.5); duplication should be avoided. This is simply good public relations between farm owners and non-farming interests.

4.2.2 Minimum separation distances

The consideration of odour and fly issues demands a reasonable standard for MSDs. Maximum benefits must be derived from the separation distance and the resulting buffer zone. Presently the 800 m and 1,400 m standards have been set arbitrarily and could result in the isolation of good agricultural land as well the alienation of small-time producers. The current distances also exceed MSDs in other provinces (Agrifoods Development Branch, 2007b: 43).

While this may set a good precedent for fly and odour management, it seems that larger buffer zones are incrementally more productive for mitigating odours than for flies. The Environmental Farm Practices Guidelines (Farm Practices Guidelines Project, 2001) have an Appendix E entitled ‘Calculating Minimum Separation Distance (MSD)’. This metric has been adapted from New Brunswick’s Manure Management Guidelines (1996) but we believe that the Province of Quebec has the most thorough algorithm (see Appendix 2). This metric can be appropriately developed for NL conditions.

- *We recommend revisiting the concept of site-specific modelling using the Province of Quebec’s guidelines for determining MSDs.*

This task should be undertaken by Agrifoods Branch in conjunction with advice from the DOEC. In most cases, MSDs from mink housing and/or manure storage facilities can be calculated specifically for a certain number of mink. In Quebec, however, the formula combines seven parameters including number of animal units, base distance, odour load, type of manure, project type, attenuation factor, and usage factor (Province of Quebec, 2003).

- *We recommend that separation distances become a reciprocal standard with clear jurisdictional authority.*

It is inevitable that MSDs create buffer zones. Developers should welcome this as buffer zones minimize disturbances created by flies and odours. An important component,

however, for agreeable MSDs is to have well-defined control over buffer zone areas especially on agricultural leases. Reciprocity must also include provisions for non-agricultural development within any buffer zone on Crown land to be administered individually or jointly between the Agrifoods Branch and DOEC. This would ensure protection for farms when other developments are proposed within the buffer zone.

4.2.3 Cap on breeder numbers

While not directly related to siting policy, after reviewing the problems encountered with flies and odours, breeder numbers are an important component for controlling manure output and resulting fly and odour impacts. Currently mink farms enjoy an unlimited quota system which allows farmers to expand their farms without restriction. It also allows for new large farms to be established.

- *We recommend a cap be placed on breeder numbers based on a farm-specific metric that considers MSDs, land holdings, manure handling systems, zoning, reciprocity, and compliance to regulations and guidelines.*

A cap on breeder numbers would serve multiple purposes. We observed that the fly and odour externalities (negative effects that are external to the desired outcomes) arising from farm operations exponentially increase in relation to breeder numbers. While it is entirely possible that sound waste management practices can minimize these externalities, one has but to look at other ramifications of large-scale operations (e.g. Aleutian Disease) to justify the need for a cap on breeder numbers.

4.3 Regulatory and enforcement regime

Currently there are few regulatory and enforcement provisions associated with mink farming in NL. The main clout for enforcement can be found under the Environmental Protection Act (Province of NL, 2002) which allows for compliance arrangements to be included in the Certificate of Approval. This does not suffice for ensuring the proper and responsible environmental management of a mink farm. Two aspects of this deficiency need to be addressed: regulation and enforcement. One option is for the Government of NL to set achievable targets and let farmers decide how they will meet them.

4.3.1 Regulation

Most of the documents pertaining to fur farming are not legally binding. This includes the Environmental Farm Practices Guidelines (Farm Practices Guidelines Project, 2001), the Recommended Code of Practice for the Care and Handling of Mink (Agriculture Canada, 1988), etc. Also, the provincial Fur Industry Strategy (Newfoundland and Labrador Fur Breeders Association, 1991: 9) refers to a Fur Farms Act that was to “consolidate application and monitoring procedures into one system” and was to include codes of practice for environmental impact as well as a single licensing procedure. This Act was never gazetted and those intentions were thus lost. Presently, there is nothing enforceable concerning the management of manure, carcasses or infrastructure that pertains directly to the control of flies and odours.

- *We recommend the creation of a clear fur farming policy that is legally binding through appropriate regulation.*

Agrifoods Branch needs a concrete policy since site-by-site management could lead to favouritism and a loss of credibility and accountability. The policy should be driven both by industry and government. It should apply the new BMPs document (2007), the Environment Farm Practices Guidelines (2001), as well as the new siting and MSD guidelines and our recommendations and become legally enforceable through appropriate regulation.

4.3.2 Enforcement

Once a regulatory regime has been implemented, the next step is to enforce its provisions. This is necessary to ensure compliance. Unfortunately this also entails additional resources devoted to monitoring and enforcement.

- *We recommend that enforcement capacity be created in the Agrifoods Branch. While there is significant debate over the jurisdictional entity, Agrifoods appears best positioned to undertake this responsibility.*

As mentioned in section 3.4.1 above, the Agrifoods Branch houses an Agricultural Extension Officer. The creation of an Enforcement Officer is a realistic approach that would

complement this responsibility that keeps expertise centred in the Agrifoods Branch. This is not a new structure as it follows the same model as the Forest Resources Branch which also operates under the Ministry of Natural Resources.

- *We recommend that the Agrifoods Branch enforce the Environmental Certificate of Approval.*

Once the enforcement capacity has been created, the Agrifoods Branch can be entitled to enforce the Certificate of Approval. In the absence of required resources, this responsibility is important enough to warrant a Memorandum of Understanding. This would require horizontal integration between the Agrifoods Branch and DOEC. This would also add to accountability if DOEC continues to set the standards for the Certificate of Approval but allows the Agrifoods Branch to handle enforcement.

- *We recommend that farm monitoring by the Enforcement Officer should occur frequently.*

Monitoring is an integral component of enforcement. Frequency of visits should be determined in partnership with Government Services Centre and DOEC. As barn clean-up should be performed on a bi-weekly basis, farm monitoring should occur at intervals to maximize observation of manure management practices. Enforcement should also, needless to say, be aware of all government initiatives such as the fly monitoring project. While not responsible for the fly monitoring itself, responsibilities should extend to support for this project by ensuring farmer compliance.

- *We recommend that the environmental permitting process be removed from the environmental assessment (EA) component.*

Once a proper regulatory and enforcement regime has been implemented, the requirement that all farms register in the EA process would become unnecessary. It appears that individualized EAs for mink farms are a poor use of resources for the Department of Environment and Conservation's EA Division. These should rather focus on areas where no standard of enforcement or regulation exists. The 'List of Projects' on the DOEC website of those undergoing the EA process is overwhelmingly allocated to new and expanding mink farms. To maintain the same level of environmental rigour, it has been suggested that a mink

farming license or other form of permitting (see Section 4.3.1) be created to ensure a minimum level of competence. This mechanism would allow items previously encountered in the EA to be accounted for and/or absorbed within the Environmental Certificate of Approval.

4.4 Best management practices

4.4.1 Landscaping

In section 1.0 of the Environmental Best Management Practices (BMPs) for Mink Production in Newfoundland and Labrador (Agrifoods Development Branch, 2007a), it states that good general appearance, proper site planning and the “effective use of the natural conditions of the site will ensure privacy and buffering of neighbouring properties as well as water bodies and sensitive areas.” It also states: “where possible, farm layout should be planned to minimize visibility from public roads by maintaining a buffer zone of natural forest cover” (Agrifoods Development Branch, 2007a). Furthermore, it states: “after farm building construction is complete, all areas with ground disturbance should be graded and revegetated to stabilize the land and to improve the aesthetics of the farm area. Mowed grass between buildings and around the perimeter of the farm buildings is ideal for improving appearance, filtering runoff, deterring pests, and facilitating efficient operations” (Agrifoods Development Branch, 2007a).

- *We recommend that all mink farms within NL actively revegetate their land.*

Efforts should be made to maintain natural forest cover surrounding the perimeter of the farm as well as, if not already existing, plant tall vegetation (trees, large shrubs) between the mink farm and any major roadway. This will help increase the level of privacy on the farm. Natural forest cover also acts as a buffer and possesses the ability to help filter unpleasant odours emanating from a mink farm. In fact, trees and shrubs can act as barriers while also absorbing particle emissions (Powers, 2004). Furthermore, upon completion of construction on any mink farm, vegetation needs to be reintroduced between all buildings on the farm, especially the mink sheds, to improve runoff filtering.

4.4.2 Facility design and health

Facility design, cleanliness and sanitation are crucial to odour and fly population reduction as well as the overall health of the farmed mink. The best approach to control odour in buildings is eliminating the source of odour rather than capturing and treating it (Jacobson, 1998). By eliminating sources of odours, potential fly and health problems are also reduced. Therefore, it is in the best interest of the farmer to construct mink sheds with sanitation in mind and strive for cleanliness within those sheds.

Shed design

Airflow and barn functionality are key considerations. All sheds should possess good ventilation systems while containing nuisance animals.

- *We recommend that all mink sheds be built with adequate ventilation to maintain good airflow.*

There are two types of ventilation systems: mechanical and natural. Mechanical ventilation produces forced circulation through the shed by the use of electric fans. These could be coupled with a biofilter where “each exhaust fan is attached to an air duct that brings the air into a plenum under the biofilter material” (Schmidt, 2000). Naturally ventilated buildings possess open sidewalls or ridge vents which allow the outside air to flow through the building. Both methods allow for air circulation which will prevent wet and damp conditions, help eliminate odours, and prevent pest insect outbreaks.

Cleanliness and sanitation

Proper manure removal and ultimately management is important for fly and odour management as well as herd health. Manure should be removed at the very least on a bi-weekly basis from under the pens during the summer and fall months. Pens and nests should be cleaned as necessary (Agriculture Canada, 1985: 14).

- *We recommend that a bi-weekly cleaning of all manure from all sheds occurs.*

During weaning season, as stated in the Environmental Best Management Practices (BMPs) for Mink Production in Newfoundland and Labrador (Agrifoods Development Branch, 2007a), “manure should be monitored on a daily basis.” When the false bottoms are

in the cages, the removal of the manure from the cages must occur on a more frequent basis. Sections 3.12 and 3.13 state: “false bottoms should be scraped at least once between whelping and weaning” and “all false bottoms should be scraped as they are removed and cleaned as soon as possible after removal.” The efficient removal of manure will also help to ensure the health of the mother and kits during this critical period in their lives, as well as control flies and odours. It may even be necessary to scrub the cages to remove unfavourable grime.

4.4.2 Manure and carcass management

The NL mink industry is growing rapidly. Due to this rapid growth, major concerns surrounding waste management, in particular the efficient and environmentally friendly disposal of the manure and carcasses, need to be addressed. It is the joint responsibility of the Agrifoods Branch, the DOEC and the mink industry itself to address these issues in a collaborative and timely manner.

In the case of carcass disposal, three of the common methods of carcass disposal (ie. burial, incineration, and rendering for feed (Morrow, 2001)) all create a number of potential economic, biological and environmental concerns (Aulerich *et al.*, 1997 in Ferguson, 2001). Furthermore, all are considered of low acceptability due to restrictive regulations, excessive costs (Morrow, 2001) and increased environmental awareness (Ferguson, 2001).

Manure is housed either as a solid or a liquid, depending on how it is collected (Purdue University, n.d.). However, concerns regarding the stockpiling of manure have been identified specifically in association with flies, odour and surface-water pollution (Miner, 1997). In light of these issues, traditional solid and liquid manure has low appeal environmentally. Recently, DOEC has recognized the downfalls of traditional carcass and manure disposal and decided to “not allow the burial of carcasses on farms and a prohibition on burial at waste disposal sites” which will “be implemented in 2008” (Department of Natural Resources, 2006). Therefore, traditional carcass and manure storage and disposal methods are not the best choices for the mink industry in NL.

- *We recommend that the composting of both carcasses and manure take place on all farms in the province. The type of composting system used should be site-specific and allow for efficient composting by the individual farmer.*

Composting is seen as friendly to the environment and relatively low cost (Baumgarten, 1996). Furthermore, a good composting operation does not generate offensive odours, or produce contaminated wastewater or potentially hazardous gases (Ferguson, 2001; Kalbasi *et al.*, 2006: 90; Stanford *et al.*, 2000). A composting pile must be managed to maintain the proper carbon-nitrogen ratio (C:N), moisture content and heat production. Each of these variables must be adequately controlled for odour-free composting to occur.

According to the Nova Scotia Agricultural College (n.d.), C:N < 25:1 will increase N losses and decrease the value of the end product, whereas > 35:1 will unnecessarily prolong the process. Moisture and temperature are directly correlated. Generally, “95 L of water will increase the moisture content of 1 tonne of manure by 10 percent” (Nova Scotia Agricultural College, n.d.). Moisture content must be regulated to produce thermophilic temperatures (>45°C). Temperatures in excess of 55°C for three days will kill most parasites and fecal and plant pathogens within the pile (Rynk, 1992 in Ferguson, 2001: 18). Temperatures in excess of 60°C exceed the threshold for the destruction of AD (Ferguson, 2001). Ultimately, under ideal composting conditions, the process accelerates carcass decay rates and produces material that can be safely applied onto cropland (Granville and Trampel, 1997 in Ferguson, 2001; Morris *et al.*, 1995 in Ferguson, 2001).

4.4.3 Pest management plan

Given recent complaints received by mink farms in NL as a result of nuisance flies, a pest management strategy is an absolute necessity for any mink farm. Implementation of an integrated pest management program (see Appendix B) is also essential to herd health and the maintenance of positive relationships with farm neighbours (BC Agricultural Counsel, n.d.; Randall, 2005; Warren, 2001).

- *We recommend that as part of the Certificate of Approval process, all mink farms must file an integrated pest management program.*

A successful pest management strategy should first and foremost eliminate any fly breeding materials from the site. The strategy will identify all steps to be taken on the farm to deter and combat pest insects. Secondly, farmers should use a combination of chemical and

physical fly control measures and application methods to eliminate and restrict the movement of flies (BC Agricultural Counsel, n.d.; BC Ministry of Agriculture, 2004; Randall, 2005). The use of secondary fly controls would be a beneficial undertaking for all fur farms in NL as most of the complaints directed at mink farms are a result of large, unmanaged fly populations. Some of these fly controls include spraying of barns with insecticides, baited jug traps, blacklight bug zappers, and screening airflow openings. Compliance with the pest management strategy could be assessed as part of the duties of the newly appointed Agrifoods enforcement officer.

4.4.4 Odour management plan

Odours emanating from an agricultural operation are subjective and addressing them is a cost that farmers would prefer to avoid. The effects of noxious odours can range from “bad frame of mind and discomfort” to the release of toxic compounds that may be potentially harmful to humans or animals (Jerzy, 1996). To reduce them will depend on either “pressure felt from neighbours or the established regulatory standards” (Powers, 1999).

One of the easiest ways to control nuisance odour issues is to establish adequate separation distances between farms and residential areas and make use of site-specific modelling techniques, as per our previous recommendations. In general, “the distance from the main production facility to the nearest neighbour is critical in minimizing air quality impacts” (Lorimor, 2004). However, because of the variety of potential sources of odours, control methods must become a priority and an odour management plan should be created to direct odour management efforts. An effective odour management plan helps to avoid nuisance odour conflicts and illustrates the farm’s intent to be a good neighbour (Schmidt *et al.*, 2001).

- *We recommend that as part of the Certificate of Approval process, all farms submit an odour management plan based on site-specific conditions.*

This will invariably be combined with other aspects of the Certificate of Approval including MSDs. The development of an odour management plan includes the following steps: identifying dominant wind conditions, creating a list of potential odour sources;

determining which sources are most likely to bring about complaints, list control strategies for significant odour sources, and develop a protocol to respond to complaints (Schmidt *et al.*, 2001). The plan will outline the expected sources of noxious odours on the farm and detail how odour reduction will be part of regular farming practices.

4.0 Conclusion

The above findings and recommendations summarize our field research for the months of June and July 2007. In light of profitable fur markets, it is obvious that the fur industry is compelled to move quickly. We would, above all, caution that the proper environmental checks be implemented for this sector to grow in a controlled and sustainable manner. The commercial mink farming industry in NL is in its infancy. The identified recommendations should provide a framework for BMPs and ways forward to mitigate the negative impacts due particularly to flies and odours. Many of our recommendations will also improve the resilience and functionality of the province's natural ecosystems including minimizing fragmentation, maintaining adequate buffer zones and promoting responsible land stewardship. Furthermore, in light of the 2007 AD outbreak and its pending impacts on operations and profitability, flies and odours are but one component of a much larger picture.

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Appendix 1: Terms of Reference for Review of Options for Fur-Farm Locations and Operations in Newfoundland & Labrador

Project Workplan prepared by

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Draft of 2007 03 19

1. Background

Fur farming, particularly mink farming, is picking up momentum in Newfoundland and Labrador (NL) (Government of Newfoundland and Labrador, 2004). While new installations may be constructed and operated in compliance with applicable laws and regulations, there may still be issues with respect to nuisance to neighbours. Two issues in particular are currently under discussion in the province: flies and odour. These issues are alleged to be offensive to neighbours of some NL mink farms (CBC Radio, 2006). They arise mainly from handling and management of feed, manure and carcasses. The objective of this project is to assess alternatives for minimizing the impacts of flies and odours from fur farms on other land users.

2. Terms of Reference

The Government of Newfoundland and Labrador has determined that the project will include the following components:

- (a) Review of current practices on mink farms in NL, including site visits to a minimum of three farms which might constitute a representative sampling of the industry.
- (b) Review and analyze existing farm practices guidelines (including separation distances between farms and other uses of lands), regulations, legislation, environmental permitting, decisions of the NL Environmental Assessment Process, decisions of the Farm Practices Review Board, and other relevant environmental/health programs.

(c) Consider provincial initiatives, including but not limited to: fly management, draft best management practices (BMPs), composting of carcasses and manure, and practices in waste management, integrated pest management and pest control.

(d) Review regulatory/enforcement regimes, standards/guidelines and BMPs in other jurisdictions with a history of fur farming, including integrated pest management techniques to control flies. Determine if controls related to fur farms are addressed separately from other livestock.

(e) Identify appropriate role of peer review (government agencies) in the implementation of BMPs and compliance with guidelines and regulations.

(f) Identify and discuss alternative manure management systems and carcass disposal options, including mechanical/automatic manure management systems.

(g) Consult with the NL Fur Breeders Association, and possibly other stakeholders, to determine their perspective on management techniques to minimize concerns related to flies and odours associated with manure and carcasses.

(h) Review of all chemical and other products licensed for application in and around occupied livestock facilities.

(i) Recommendations are to be produced in the project, and are expected to cover:

- BMP needs;

- Alternative waste management techniques and disposal options;

- other guidelines and standards including suggestions for regulatory changes.

Results of the project will be reported in three stages:

Stage 1 – synthesis of literature/document review – 2007 05 31

Stage 2 – preliminary findings from field studies – 2007 08 31

Stage 3 – final full report with recommendations – 2007 12 31

Research Team

The principal investigator and project leader is Peter Duinker, since 1998 a professor of resource and environmental studies at Dalhousie University (see abbreviated CV attached; a full CV is available at sres.management.dal.ca/People/Faculty/Duinker/index.php). Peter has extensive hands-on experience in farming, having worked on several family farms until early adulthood. He holds a BScAgr from the University of Guelph, a Master's degree in environmental studies from Dalhousie, and a PhD in forest management and environmental assessment from UNB in Fredericton. Peter teaches, researches and provides advisory services in a range of fields associated with resource and environmental management. He

has been advising the Government of Newfoundland and Labrador on matters related to forest management and environmental assessment since the early 1990s.

Two Dalhousie University students - both studying for the Master of Resource and Environmental Management - will implement most of the research tasks associated with the project. Keith Pickthorn has a BSc in Zoology from the University of Guelph, and Ryan Van der Marel studied at Queen's University for a BA in Geography as well as a BA in International Development Studies.

Appendix 2: Guidelines for determining minimum separation distances⁵

Guidelines for determining minimum distances to ensure odour management in rural areas, R.Q. c. P-41.1, r.1.1

- Citation: Guidelines for determining minimum distances to ensure odour management in rural areas, R.Q. c. P-41.1, r.1.1
- Information about this text: Replaced, M.O., 2003012, 2003 G.O. 2, 1919A; eff. 2003-06-21, see P-41.1R3.02
- Enabling Statute: Preservation of agricultural land and agricultural activities, An Act respecting the, R.S.Q. c. P-41.1
- Version downloaded by CanLII on 2007-03-07

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c. P-41.1, r.1.1

Guidelines for determining minimum distances to ensure odour management in rural areas

Replaced, M.O., 2003012, 2003 G.O. 2, 1919A; eff. 2003-06-21, see P-41.1R3.02

1. OBJECT

The following provisions pertain only to inconveniences due to odours resulting from agricultural activities; the overall proposed parameters do not concern aspects relating to pollution control. The aim of the provisions is not to except agricultural producers from the obligation to respect environmental standards contained in specific regulations of the Minister de l'Environnement et de la Faune, but to establish optimally a suitable procedure for determining minimum distances that will foster harmonious coexistence in rural areas.

In addition, the provisions serve as guidelines in the case of certificates of authorization to be issued by the Minister of the Environment and Wildlife with regard to odours. However, Schedule G serves only for the application of government aims by regional county municipalities and municipalities.

M.O., 98-03-02, s. 1.

2. DEFINITIONS

Dwelling

A dwelling or shelter on the farm premises, covering a minimum of 21 m², not belonging to the owner or the operator of the livestock facilities in question or to a shareholder or manager of a corporate entity which owns or operates these facilities, or not accommodating one or more of its employees.

Protected immovable

- (a) a business or recreational, sports or cultural centre;
- (b) a municipal park;
- (c) a public beach or marina;

⁵ While this document was prepared to deal with odour control, its applicability is ubiquitous separation distances (see Reciprocity Principle and Odour Load). Again, developments can be made to make this metric appropriate for NL context.

(d) property belonging to an educational establishment or an establishment to which the Act respecting health services and social services (R.S.Q., c. S-4.2) applies;

(e) a campground;

(f) buildings belonging to a conservation area or a nature interpretation centre;

(g) a ski lodge or golf clubhouse;

(h) a religious temple;

(i) a summer stock theatre;

(j) a restaurant, vacation centre or youth hostel as defined in the Regulation respecting tourist establishments;

(k) a vineyard or restaurant holding a year-round operating permit;

Bicycle paths not comprised within a municipal park are not considered as a protected immovable.

Municipal urbanization perimeter

The boundary envisaged for the growth of a municipality's urban areas, as defined in its development plan, and any new boundaries defined by an amendment to the development plan, with the exception of any portion of this growth occurring within an agricultural zone.

Outdoor feeding area

An area outside a building where livestock is kept periodically or permanently and where it feeds on food originating solely outside this area.

Marina

Site designated as such on a municipal zoning map or regional country municipality development plan.

Camping

Site designated as such on a municipal zoning map or regional country municipality development plan.

Public highway

A roadway designed for automobile traffic, maintained by a municipality or by the Ministère des Transports, or a bikeway (bicycle path, protected or unprotected bike lane).

Solid manure management

Management practices reserved for manure comprising livestock excrement, litter and bedding materials, which is stored in solid form and handled using a loader.

Liquid manure management

Management practices reserved for liquid manure comprising primarily livestock excrement, litter, bedding materials and wash-water, which is liquid in form and is handled by pumping.

Livestock facility

A livestock facility or feeding area for keeping livestock, a structure or facility for storing farm manure, or several such facilities, each of which is less than 150 m from a neighbouring facility and belongs to the same operation.

M.O., 98-03-02, s. 2.

3. MINIMUM DISTANCES FOR MANURE SPREADING

The minimum distances for livestock facilities are computed using formulas combining seven (7) parameters specific to the category of neighbouring unit in question.

These parameters are as follows:

Parameter A: number of animal units.

It is calculated using the table in Schedule A.

Parameter B: base distance.

This table constitutes Schedule B. Select the base distance corresponding to the value calculated for parameter A.

Parameter C: odour load.

The table in Schedule C presents odour potential by livestock group or category.

Parameter D: type of manure.

This table constitutes Schedule D.

Parameter E: project type.

Schedule E contains the values to be used whether the project is designed to establish a new operation or expand an existing operation. An increase involving 300 units or more is equated with a new project.

Parameter F: attenuation factor.

This parameter reflects the attenuating effect of the technology used. While Schedule F indicates certain values, it will be supplemented by attenuation factors assigned new systemic management practices, equipment and technologies as they are validated and accredited. Insisting on the importance of this factor will be a powerful incentive to use the innovations available.

Parameter G: usage factor.

This factor is based on the type of neighbouring unit in question. To determine minimum distance, parameters B, C, D, E, F and G are multiplied, the latter using the following values:

- for a protected immovable, the minimum is obtained by multiplying the set of parameters by $G = 1.0$;
- for a dwelling, $G = 0,5$;
- for an urbanization perimeter, $G = 1,5$;
- for a public roadway, $G = 0,1$, however all facilities must consider a minimum distance of six (6) meters from a lot line.

M.O., 98-03-02, s. 3.

4. VESTED RIGHTS

Parameter E (project type) recognizes the vested rights related to expanding small existing farms. Under certain other circumstances, other vested rights apply where minimum distances for the following are concerned. For operations with 100 animal units or fewer, the type of livestock may be changed, provided the same number of animal units and effluent management is maintained or replaced by more favourable management practices targeting the nuisances associated with odours. For other operations, the type of livestock may be changed only if the minimum distance calculation parameters are respected. A vested right is also recognized for rebuilding following a fortuitous event or for renovating livestock facilities in the same spirit as above.

M.O., 98-03-02, s. 4.

5. MINIMUM DISTANCES FOR FARM MANURE STORAGE SITES LOCATED MORE THAN 150 M FROM LIVESTOCK FACILITIES

When farm manure is stored off the livestock operation, minimum distances to be respected are based on the consideration that one animal unit requires a 20- m^3 storage capacity. To determine the value of parameter A, every 1000- m^3 tank capacity corresponds to 50 animal units. Once parameter A has been determined, the

corresponding value of B can be found, and the formula $B \cdot C \cdot D \cdot E \cdot F \cdot G$, applied. The following table illustrates cases for which C, D, E and F equal 1, with only G varying with the neighbouring unit in question.

Minimum distances for liquid manure storage sites ¹ located more than 150 m from a livestock facility

Storage capacity (m ³)	Minimum distances (m)			
	Dwelling	Protected immoveable	Urbanization perimeter	Public roadway
1 000	148	295	443	30
2 000	184	367	550	37
3 000	208	416	624	42
4 000	228	456	684	46
5 000	245	489	734	49
6 000	259	517	776	52
7 000	272	543	815	54
8 000	283	566	849	57
9 000	294	588	882	59
10 000	304	607	911	61

¹ For solid manure, multiply these distances by 0,8.

For other storage capacities, use the rule of apportionment or the data for parameter A.

M.O., 98-03-02, s. 5.

6. MINIMUM DISTANCES FOR SPREADING FARM MANURE

Farm manure shall be spread in keeping with the minimum distances indicated in the following table.

Minimum distances for spreading farm manure

Type	Spreading method	Minimum distance from a dwelling, urbanization perimeter or protected immoveable (m)	
		June 15 to August 15	Other times
	sprinkler	300	300
	lance (cannon)	300	300
L I Q U I D	aero-sprinkling liquid manure tank left on the surface more than 24 h	75	25
	liquid manure tank incorporated within less than 24 h	25	X
	by spraybar	25	X

sprinkling -----			
	by drop pipe	X	X

	simultaneous incorporation	X	X

S	fresh, left on the surface	75	X
O	more than 24 h		
L	-----		
I	fresh, incorporated within 24 h	X	X
D	-----		
	deodorized compost	X	X

◆ X = Spreading permitted up to field edge.

This table does not apply to uninhabited urbanized perimeters, in which case spreading is permitted to the field edge.

M.O., 98-03-02, s. 6.

7. RECIPROCITY PRINCIPLE

Minimum distances to be respected are valid both ways; this is the reciprocity principle. If there already exists an agricultural use at the time a non-agricultural use is being planned in a white zone adjacent to a green zone, the distance to be respected is the same as if the reverse situation had occurred, that is, the distance to be respected is the same if the adjacent non-agricultural use had existed prior to the implementation of the said agricultural use. However, it is understood that section 79.2, introduced in the Act to preserve agricultural land and agricultural activities and other legislative provisions in order to promote the preservation of agricultural activities, can be used by a municipality.

To maintain a certain potential for development by livestock operations, it is advisable to set a limit in the green zone of 367 metres (value of parameter B for 100 animal units), corresponding to the distance within which a protected immovable could not be built. Adjustments would be required for a dwelling (184 m), an urban area boundary (550 m) and a public road (37 m).

M.O., 98-03-02, s. 7.

8. Revoked.

M.O., 98-03-02, s. 8; M.O. 01-10-03, s. 1.

9. Omitted.

M.O., 98-03-02, s. 9.

10. Omitted.

M.O., 98-03-02, s. 10.

SCHEDULE A

NUMBER OF ANIMAL UNITS (PARAMETER A) ¹

Livestock group or category	Number of animals equivalent to one animal unit
Cow or heifer, bull; horse	1
Calf or heifer weighing 225-500 kg	2
Calf weighing less than 225 kg	5

Breeder hogs weighing 20-100 kg each	5
Sows and piglets not weaned during the year	4
Piglets weighing less than 20 kg	25
Laying hens or roosters	125
Broiling or roasting chickens	250
Started pullets	250
Turkeys weighing more than 13 kg	50
Turkeys weighing 8,5 - 10 kg	75
Turkeys weighing 5 - 5.5 kg	100
Female mink (males and young are not calculated)	100
Vixen (males and young are not calculated)	40
Ewes and new-crop lambs	4
Goats and new-crop kids	6
Female rabbits (males and young not calculated)	40
Quail	1500
Pheasants	300

¹ This table is provided for information purposes only; a complete table will be compiled by reducing the gaps between categories. The basis remains 500 kg per animal unit.

The weight indicated in this schedule refers to the animal's weight at the end of the breeding period. For all other animal species, a live weight of 500 kg equals one animal unit.

M.O., 98-03-02, Sch. A.

SCHEDULE B

BASE DISTANCE (PARAMETER B) ²

Total number of animal units	Distance (m)	Total number of animal units	Distance (m)	Total number of animal units	Distance (m)
10	178	300	517	880	725
20	221	320	528	900	730
30	251	340	538	950	743
40	275	360	548	1000	755
50	295	380	557	1050	767
60	312	400	566	1100	778
70	328	420	575	1150	789
80	342	440	583	1200	799
90	355	460	592	1250	810

100	367	480	600	1300	820
110	378	500	607	1350	829
120	388	520	615	1400	839
130	398	540	622	1450	848
140	407	560	629	1500	857
150	416	580	636	1550	866
160	425	600	643	1600	875
170	433	620	650	1650	883
180	441	640	656	1700	892
190	448	660	663	1750	900
200	456	680	669	1800	908
210	463	700	675	1850	916
220	469	720	681	1900	923
230	476	740	687	1950	931
240	482	760	693	2000	938
250	489	780	698	2100	953
260	495	800	704	2200	967
270	501	820	709	2300	980
280	506	840	715	2400	994
290	512	860	720	2500	1006

² Source: Adapted from the German Association of Engineers VDI 3471

M.O., 98-03-02, Sch. B.

SCHEDULE C

ODOUR LOAD PER ANIMAL (PARAMETER C) ³

Livestock group or category	Parameter C
Beef cattle	
-in a closed facility	0,7
-in an outdoor feeding area	0,8
Dairy cattle	0,7
Ducks	0,7
Horses	0,7
Goats	0,7

Turkeys	
-in a closed facility	0,7
-in an outdoor feeding area	0,8
Rabbits	0,8
Sheep	0,7
Hogs	1,0
Hens	
-laying hens in cages	0,8
-breeder hens	0,8
-broiler hens/large chickens	0,7
-pullets	0,7
Foxes	1,1
Slaughter calves	
-veal calves	1,0
-grain-fed calves	0,8
Mink	1,1

³ For all other animal species, C = 0,8.

M.O., 98-03-02, Sch. C.

SCHEDULE D

TYPE OF MANURE (PARAMETER D)

Farm manure management practices	Parameter D
Solid manure	
Beef and dairy cattle, horses, sheep and goats	0,6
Other livestock groups and categories	0,8
Liquid manure	
Beef and dairy cattle	0,8
Other livestock groups and categories	1,0

M.O., 98-03-02, Sch. D.

SCHEDULE E

TYPE OF PROJECT (PARAMETER E)

[new project or increase in the number of animal units]

Increase 4 up to... (a.u.)	Parameter E	Increase up to... (a.u.)	Parameter E
10 or fewer	0,50	181-185	0,76
11-20	0,51	186-190	0,77
21-30	0,52	191-195	0,78
31-40	0,53	196-200	0,79
41-50	0,54	201-205	0,80
51-60	0,55	206-210	0,81
61-70	0,56	211-215	0,82
71-80	0,57	216-220	0,83
81-90	0,58	221-225	0,84

91-100	0,59	226-230	0,85
101-105	0,60	231-235	0,86
106-110	0,61	236-240	0,87
111-115	0,62	241-245	0,88
116-120	0,63	246-250	0,89
121-125	0,64	251-255	0,90
126-130	0,65	256-260	0,91
131-135	0,66	261-265	0,92
136-140	0,67	266-270	0,93
141-145	0,68	271-275	0,94
146-150	0,69	276-280	0,95
151-155	0,70	281-285	0,96
156-160	0,71	286-290	0,97
161-165	0,72	291-295	0,98
166-170	0,73	296-300	0,99
171-175	0,74	300 and more or	1,00
176-180	0,75	new projects	1,00

⁴ To be taken into consideration depending on the targeted number of animals in the herd, whether or not buildings are expended or built. For projects resulting in a total of 300 or more animal units and for new projects, E = 1.

M.O., 98-03-02, Sch. E.

SCHEDULE F

ATTENUATION FACTOR (PARAMETER F)

$$F = F_1 \cdot F_2 \cdot F_3$$

Technology	Parameter F
Cover over storage site	F 1
-absent	1,0
-rigid, permanent	0,7
-temporary (layer of peat, plastic covering)	0,9
Ventilation	F 2
-natural and forced with multiple air outlets	1,0
-forced with grouped air outlets and air outlets above the covering	0,9
-forced with grouped air outlets and each treatment with air washers or biological filters	0,8
Other technologies	F 3
-new technologies enabling distances to be reduced once their effectiveness has been proven	factor to be determined upon accreditation

M.O., 98-03-02, Sch. F.

SCHEDULE G

SITING STANDARDS FOR BREEDING FACILITIES OR YARDS FOR NEIGHBOURING DWELLINGS, POPULATION CENTRES, PROTECTED IMMOVEABLES OR MUNICIPAL ZONES EXPOSED TO PREVAILING SUMMER WINDS

(Linear distances are expressed in meters)

see 1998 G.O. 2, 1293

M.O., 98-03-02, Sch. G.

M.O., 98-03-02, 1998 G.O. 2, 1286

M.O., 2001-10-03, 2001 G.O. 2, 5677

Appendix 3:

INTEGRATED PEST MANAGEMENT (IPM) IMPLEMENTATION

IPM is a site-specific pest management program that is considered an environmentally friendly pest control solution. It takes into account the ecology of the environment and works to use natural pest interactions along with mechanical and chemical control methods to control pest populations. An IPM program involves six basic steps that are easy to implement and can often be tied into regular farming activities:



STEP 1: IDENTIFICATION

Each farm needs first to determine which insects are present on site and which specifically are a nuisance. Not all species require control. Many insect species are innocuous, while others are beneficial to the area and may even aid pest control efforts as natural predators to pest insects. Proper identification of the pest is essential to understanding the pest's life cycle and habits. Furthermore, proper identification is necessary for selecting which control strategies will be used, which will be most effective and knowing when and how to implement them.



STEP 2: ACTION THRESHOLDS

Before actual pest control action is put into place, each individual ranch needs to determine its specific action threshold. An action threshold is the point at which a pest populations or environmental conditions indicate that pest control actions must be taken to avoid potential herd and economic damage. By setting an action threshold, each ranch will be able to plan appropriately for pest outbreaks as well as give hard values for when active pest management techniques are needed such as chemical control.

KEY BENEFITS

- Improved control of nuisance flies and insects
- Better living conditions for animals
- Better working conditions for employees
- Reduced risk of disease transmission
- Reduced harmful insecticide use
- Decreased risk of insecticide resistant pests
- Decreased risk of complaints from farm neighbours
- Reduced environmental impact
- Environmentally friendly solution



STEP 3: MONITORING

Monitoring allows for the detection, identification, and determination of the level of pest populations on site in a timely manner. Monitoring includes using traps, visual inspections, and interviews with staff members to identify pest population densities both formally and informally and can be incorporated into other daily activities such as feeding, cleaning or building maintenance.



STEP 4: PREVENTION

The first line of defense in pest control is to manage all potential sources of pest breeding on the farm. This will prevent pests from becoming a nuisance. Simple preventative control methods include regular barn cleaning, proper manure, waste and litter collection, proper carcass disposal, as well as fixing leaking water sources, removing old food, and promoting natural pest predator populations on site. Preventative methods are practices which should be practicing anyways, and therefore can be effective and cost-efficient.



STEP 5: CONTROL

Once monitoring and action thresholds indicate that pest control is required, and preventative methods are no longer effective, IPM programs should then evaluate the proper control method to be used to remedy the pest problem. Choice of a pest control method should follow these criteria to minimize negative impacts: (1) least hazardous to human health; (2) least disruptive of natural controls; (3) least toxic to non-target organisms; (4) most likely to be permanent; (5) easiest to carry out safely and effectively; (6) most cost-effective; and (7) most site-appropriate. The most environmentally friendly, pest specific control methods (ex. pheromones traps) should be used first followed by the use of more generalist control methods (ex. chemical insecticides). Monitoring should take place during all control stages to assess the effectiveness of control tactics.



STEP 6: EVALUATION

At each stage of the IPM program, evaluation should take place to determine whether that stage is effective at achieving its intended purpose. Program evaluation involves reviewing monitoring data, actions taken, treatment impacts and effectiveness, and any other relevant observations. After a pest outbreak, the entire IPM program should be evaluated as a whole to allow for changes and fine-tuning, thus creating the most effective program for the specific ranch. Evaluation data should be kept so that, in the future, information on previous and current pest populations in the areas as well as which control methods were applied is available. This is essential to an IPM program as a good program is flexible and constantly adapting and evolving into the best possible solution.