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Guidelines
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Siting and
Management of
Hog Farms
in Nova Scotia

Revised September, 2000


NOVA SCOTIA
Agriculture and Marketing

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I. Introduction

These management practices and siting considerations have been developed to provide guidance for the hog production industry, for municipalities, and for planners in agricultural areas in Nova Scotia. They recognize the need for change and compromise to achieve compatibility between agriculture and other interests of the general public.

This guideline deals with the management issues associated with hog farms and refers to specific measures, which are acceptable farming practices, that can reduce odour or eliminate water pollution problems on Nova Scotia hog farms. The siting portion addresses separation distances from the hog barn or manure storage to off-farm dwellings, property lines, non-farm development, public roads, and off-farm wells and any watercourse. These distances apply to expansion of existing hog farms and the creation of new hog farms. This guideline has been developed with consideration for all stakeholders, but any on-farm changes to management practices should be cost effective and technically feasible.

II. Existing Legislation

The field of environmental legislation is a complex one, with many federal, provincial, and municipal regulations and bylaws. These include the Provincial Environment Act, the Agricultural Operations Protection Act, the Federal Fisheries Act, and applicable municipal bylaws. The *Environmental Regulations Handbook for Nova Scotia Agriculture*, published by the Nova Scotia Department of Agriculture and Marketing, summarizes the various legislative statutes, regulations, and bylaws that affect agricultural operations from an environmental standpoint. Construction of livestock facilities is regulated by municipal bylaws for structural adequacy and may, in some municipalities, be regulated in terms of location. Location may be conditional upon zoning controls, setback requirements, and separation distances being satisfied. Structural adequacy is addressed by having livestock buildings constructed according to the National Building Code of Canada, the Nova Scotia Building Code, and the National Farm Building Code of Canada. Most municipalities require a combination of development permits, building permits, occupancy permits, and inspections to authorize the construction of each particular building.

III. Objective

The objectives of these guidelines are to:

1. Provide information and guidance to farmers, on how to manage hog farms in an environmentally acceptable manner.
2. Provide municipalities with information on acceptable management practices and siting guidelines for hog farms, which may be incorporated into municipal bylaws.
3. Provide all stakeholders, including hog farmers, planners, environmental agencies, and financial institutions, with guidelines to assess the siting and management of hog farms.

IV. Acceptable Management Practices

A. Liquid Housing System

Manure is an inevitable part of hog operations. In hog barns, manure can accumulate in gutters and pits under barn floors and become a food source for bacteria. As anaerobic (without air) bacteria decompose the manure, the gases produced form an odour. These foul-smelling gases include ammonia, hydrogen sulphide, volatile fatty acids, and trace organic compounds. These gases are in the form of tiny bubbles attached to manure particles. They can accumulate in the manure during storage, for example, while the manure is in a pit beneath the barn. Agitation of the manure, such as when it is flushed to storage, releases these bubbles and can result in high gas concentrations.

Other sources of odours in the barn are wet, manure-covered floors, manure-covered pigs, spilled feed, and dust from feeders and pigs. Gases associated with odours become attached to dust. If the amount of dust is reduced, odours can also be reduced.

Potential odours may be suppressed by following these measures:

1. **Proper ventilation** is required to prevent drafts and the buildup of dusts, gases, moisture, and heat. Ventilation requirements — such as number, size, and placement of fans, ventilation controls, and properly adjusted air inlets — should be determined by a qualified ventilation specialist.
2. **Proper barn insulation** will help control temperature and prevent condensation. Insulation and vapor barrier placement should be determined by a qualified specialist.
3. **Proper pen size** for the number of pigs is important. When pigs are introduced to an empty pen it should be clean and dry.
4. The **dunging section** of the pen should be slatted or cleaned daily.
5. Since the gas hazard and odour increases with storage time, hog barns should be planned and operated so that the **manure is removed** from the barn as frequently as possible. As little **agitation** as possible should take place during the removal of the manure from the barn.
6. **Feeders** should be covered and pelleted feed is preferred to decrease dust. Dry feeders should be placed on the side wall, close to the front of the pen. Wet-dry feeders should be placed close to the dunging area.
7. **Waterers** should be placed in the dunging area.
8. The **sleeping area** walls should be solid.
9. **Sprinklers** for cooling should be placed over the dunging area.
10. **Interior surfaces** should be smooth to make cleaning easier.

B. Bedded Housing Systems

A bedded housing system with dry material such as straw, hay, sawdust, or shavings helps absorb the liquids in the manure. Loose-housing management systems allow manure to build up and develop a “bedded” pack in the housing facility. This pack may accumulate to a depth of one metre.

The following are some practices that can be used in a bedded-housing system.

1. Sufficient **bedding** should be used and added as necessary to keep pens dry.
2. Solid **unbedded floor** areas around feeders and waterers should be scraped frequently to maintain clean, dry surfaces.
3. If conditions do not permit field spreading of manure when it has to be removed from the barn, it should be stacked in a **storage area** with a concrete floor. Walls around the storage help to contain the manure, facilitate loading, and also help to improve the appearance of the storage area. A picket dam in the corner will contain manure solids and allow liquids to flow to a holding lagoon or treatment system.
4. Manure may be temporarily stockpiled in fields, provided it does not pollute ground water or a watercourse. **Manure storage siting** guidelines should be followed when stockpiling manure.

C. Manure Storage

Liquid manure can be stored in below-ground concrete storages. Above-ground circular manure storages are a good alternative when there are limitations of space, a high water table, or where bedrock is close to the ground surface.

Manure in a roofed or covered storage will usually crust over, thereby reducing odour and fly-breeding problems. Manure can be transferred from the barn to the storage by pumping or by gravity. Liquid manure storages are agitated before spreading by diverting part, or all, of the pumped liquid through an agitator nozzle. The liquid stream breaks up any surface crust, stirs settled solids, and makes a more uniform mixture to be pumped to the spreader.

Earthen storages can provide long-term storage at a low or moderate investment if site and soil conditions permit. Earthen storages have sloping walls which create a larger surface, resulting in more precipitation being collected. They are designed and constructed to prevent ground- and surface-water contamination. Some of the factors to be considered before using earthen storages are soil texture, water table depth, depth to bedrock, sideslope, and the volume of manure and precipitation to be stored.

The objective of proper livestock manure handling and storage is that manure can be contained during the storage period so it can be used as a source of nutrients to grow crops.

The following practices should be followed to insure proper manure storage.

1. The **setback distances** for manure storages are given in the siting portion of this document.
2. All liquid and solid manure should be contained within the storage and the storage should not **leak or overflow**.
3. The area surrounding both the storage and barn should be graded so that **surface water** is routed away. Buildings should have a suitable eaves trough or roof water drainage where the outlet drains into a catch basin or surface drain.
4. **Covered storages** reduce the volume of water that must be spread and can also decrease odour emissions.
5. When manure is transferred to the storage, the end of the **transfer pipe** should be submerged in the storage. This will prevent splashing, which should decrease odour production.
6. Storages should be **visually screened** from public view. This can be achieved with windbreaks such as coniferous trees or a high fence. This may also help to dissipate odours from the storage.
7. In-ground storages should not be situated where **flooding** may occur or where a high watertable exists, for an extended period of time.
8. Manure storages should be able to contain **seven months** production of manure plus precipitation (if uncovered) and have a 0.3 m freeboard.
9. Manure storages can be an excellent habitat for flies and fly breeding. Management practices are necessary to reduce the possibility of fly outbreaks associated with hog production. For information on fly management, contact the local Agricultural Representative.

D. Manure Spreading

When manure is spread on fields, odourous compounds are released. Until the manure becomes dry, wind can move these odourous gases off site. Odours usually subside within a few days unless humidity levels are high or the spreading rate is excessive.

Prior to field application an analysis should be done on samples of the manure to determine the concentration of both phosphorus and nitrogen. In turn the application rate should be estimated by considering the crop requirements. Excess phosphorus or nitrogen, from high application rates of manure, can lead to ground- or surface-water contamination.

A few points which should be considered:

1. Have adequate **land area** available to efficiently utilize the manure produced.
2. Ensure manure hauling and **spreading equipment** is suited to both the type and consistency of manure produced on the farm.
3. Schedule manure spreading to provide the greatest **benefit** to both the **soil** to be farmed and the **crop** to be grown.
4. Avoid spreading manure on **snow** or **frozen ground**. Manure applied under these conditions will not be absorbed into the soil and therefore the nutrient value of the manure will not be utilized. Runoff is also a potential source of water contamination.
5. Avoid manure spreading on **calm, hot, humid days** if at all possible. The best time to spread is a sunny, windy day when there is a sufficient air mixing high above the ground.
6. If the manure is spread early in the day during **dry, breezy weather**, much of it will dry before humidities increase later in the day or evening.
7. Try to avoid spreading manure on **weekends or holidays**.
8. Consider the **prevailing wind direction** when spreading manure.
9. Do not spread on land where possible **runoff** may flow to surface water.

10. Manure should not be applied within 30 metres (96 feet) of an **existing well** on a clay loam or loam soil, and not within 60 metres (192 feet) on a sand or gravel soil.
11. **Regular soil testing** should be performed to determine the nutrient status of fields and fertilizer requirements of crops, as well as the nutrient content of the manure.
12. Calibrate manure spreaders to ensure correct **manure application rates**.
13. Avoid spreading manure on wet fields which can result in soil **compaction**.
14. When possible, **incorporate** manure into the soil as soon as possible after spreading on crop land.
15. Avoid **overfilling** spreaders and do not **spill** manure on roads.

For more detailed information on hog housing, manure storages, and spreading of manure, contact the Nova Scotia Department of Agriculture and Marketing.

V. Siting of Hog Facilities

Nova Scotia hog facilities have been situated in areas where adjoining lots have been sold for residential development, or where new non-farming neighbours have bought existing homes. Many municipalities do not have agricultural zoning and there are no other restrictions on the siting of homes near farming operations. New neighbours are often unaccustomed to farming activities associated with hog operations, including dust, noise and odours. At the same time it is impractical to relocate the hog operation because of the investment in the facility on that site. Furthermore, it is often impractical to adopt costly technology to reduce odours, although certain management practices, as contained in this document, can be utilized to reduce odours and their impact on the general public.

The following guidelines for hog facility expansion or new construction consider the needs and separation distances of all property owners. They suggest separation distances which are, in many instances, greater than those in the existing guideline, *Guidelines for the Management and Use of Animal Manure in Nova Scotia*, Publication No. R-91-2000, by the Nova Scotia Department of Agriculture and Marketing. The revised separation guidelines, however, are not so great as to hinder the building of new hog farms in Nova Scotia.

The following hog facility separation distance provisions are based on the number of animal units. Animal units are determined by using the following list which is based on farm type and number of animals that equals **one animal unit**.

1. One sow – farrow to finish barn
2. Four sows – farrow to wean barn
3. 50 weaner pigs (7–20 kgs.) – nursery barn
4. 10 feeders (20–100 kgs.) – finisher operation (no sows)
5. Five sows – breeding/gestation barn

Examples:

1. 100 sows farrow to finish equals 100 animal units
2. 100 sows farrow to wean equals 25 animal units
3. 500 pig place finisher nursery barn equals 10 animal units
4. 1000 pig place feeder barn equals 100 animal units
5. 500 sow breeding/gestation barn equals 100 animal units

A. Expansion of Existing Hog Facility Up to 50 Per Cent

Expansion, up to 50 per cent, on an existing site can take place providing the site meets the separation distances contained in the *Guidelines for the Management and Use of Animal Manure in Nova Scotia*, Nova Scotia Department of Agriculture and Marketing Publication No. R-91-2000. That Publication states, the minimum recommended separation distances from animal production facilities and manure storages as follows:

- to areas zoned residential – 600 m.
- to property lines or dwellings – 50 m.
- to water courses/wells – 100 m.
- to a provincial highway – 50 m.

Although a farmer may meet existing guidelines, it is important to consider the advantages of looking at alternative sites that do meet the siting guidelines in Table A-1 on page 11. These include the ability to expand beyond 50 per cent, the availability of land to spread manure, and the size of the operation required to remain profitable in future years. In the long term a new site may insure longevity of the entire operation. It is recommended that existing hog operations may expand up to 50 per cent based on the number of animal units on the property as of January 1, 1999.

B. Expansions Between 50 and 100 Per Cent

When a farmer wants to expand an existing hog operation between 50 and 100 per cent and **cannot** meet the distances specified in Table A-1, but does meet the separation distances contained in the *Guidelines for the Management and Use of Animal Manure in Nova Scotia* described in A above, it is recommended that an environmental site assessment be completed by a qualified professional consultant who will dictate the terms under which the expansion can proceed.

C. Expansions Greater Than 100 Per Cent

If a farmer wants to expand an existing hog operation by more than 100 per cent, it is recommended that Table A-1, be followed.

D. New Hog Facilities

If someone wants to build a new hog facility, it is recommended that Table A-1, be followed.

E. Neighbours' Consent

In cases where a proposal is unable to meet the separation distance for "off-farm dwelling" as specified in Table A-1, it can proceed if all neighbouring property owners within the separation distance give written consent. This provision applies to expansions of an existing operation covered under B or C above or construction of a new facility under D. All other separation distance figures given in Table A-1 continue to apply.

F. Municipal Strategy

In a municipality where a municipal strategy and an agricultural land use bylaw is in effect, the setback distance established by the planning documents will be used as the separation distance to an off farm dwelling.

G. Technology To Reduce Separation Distances

Certain technologies can decrease the recommended separation distances to 50 m from off farm dwellings. Ref: *Guideline for the Management and Use of Animal Manure in Nova Scotia* (revised 1991).

1. Covered manure storage and a barn that uses a system designed to have the manure removed from the barn daily; example: under floor scrapers. Covered storages include a heavy polyester fabric or a roof constructed of wood or concrete.
2. Solid manure pack; example: unheated shelter.
3. New technologies as they become proven.

H. Non-farm Development

Where no municipal planning documents are in effect, the separation distances specified in Table A-1 are large enough so that a farm, following acceptable management practices, can operate without disturbing neighbouring property owners. However, once a new or expanded hog farm is in operation, it is possible that non-farm development could take place within the separation distance. This could both result in complaints and limit the farm from future expansion when the guidelines are applied.

TABLE A-1

Separation Distance from Hog Barn or Manure Storage					
Size of Operation in Animal Units	Off-farm Dwelling (m)	Property Line (m)	Non Farm Development (m)	Public Road (m)	Off-farm Well or Any Watercourse (m)
1 - 100	300	50	600	50	100
101 - 200	350	50	600	50	100
201 - 300	400	50	600	50	100
301 - 400	450	50	600	50	100
401 - 500	500	50	600	50	100
501 - 600	600	50	600	50	100
601 - 700	700	50	700	50	100
701 - 800	800	50	800	50	100
801 - 900	900	50	900	50	100
900 and greater	1000	50	1000	50	100

The management guidelines and separation distances contained herein, describe a high level of management and care for hog operations. To reduce potential conflicts between hog farmers and neighbouring property owners, municipalities are encouraged to apply the separation distances to both the farm and neighbouring properties through their municipal planning strategies and land use bylaws. In the absence of bylaws to control non-farm development within the prescribed distance for hog farms, the separation distances should be considered as accepted standards for both the establishment and expansion of hog operations and non-farm development. Non-farm development within the separation distances should be discouraged. If development is unavoidable, measures should be taken to ensure that hog operations are protected from nuisance complaints. Any development wanting to locate in the area of hog farms should be notified that hog farm-related activities are an approved and priority land-use activity, and will be given precedence over other activities. Development occurring after the farm should be a consideration in dealing with any action or complaint against a farmer by a neighbouring property owner.

VI. References

Canadian Pork Council, *Canadian Code of Practice for Environmentally Sound Hog Production*, 1996.

Nova Scotia Department of Agriculture and Marketing, *Guidelines for the Management and Use of Animal Manure in Nova Scotia*, Publication No. R-91-2000, 1991.

Nova Scotia Department of Agriculture and Marketing, *Environmental Regulations Handbook for Nova Scotia Agriculture*, January, 1997.

Nova Scotia Department of Agriculture and Marketing, *The Development of an On-Farm Manure Management Program*, March, 1996.

Nova Scotia Department of Agriculture and Marketing, *Factsheets on Manure Nutrients, Manure Spreader Calibration, Earthen Manure Storages, and Integrated Fly Management for Livestock Farms*.

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