ADVISORY COUNCIL ON THE ENVIRONMENT

(16.5.1994)

(ACE 26/94)
for advice

The Livestock Waste Control Scheme
Code of Practice : Livestock Waste Management
Under Section 35 of the Waste Disposal Ordinance

Introduction

This paper seeks Members' support for the revised Code of Practice : Livestock Waste Management.

Background

2. Under Section 35 of the Waste Disposal Ordinance (Cap. 354), the Secretary for Planning, Environmental and Lands may, after consultation with the Advisory Council on the Environment, prepare and revise Codes of Practice (COP) giving guidance and directions as to the collection, storage, treatment, transportation and disposal of waste, including livestock waste. Failure of any person to observe Code of Practice shall not of itself render that person liable to criminal proceedings of any kind but any such failure may, in any proceedings whether civil or criminal and including proceedings for an offence under the Waste Disposal Ordinance, be relied upon as tending to establish or to negative any liability which is in question in those proceedings.

3. A COP on livestock waste management was published, in both English and Chinese, by the then Secretary for Health and Welfare in early 1988. The COP advises livestock farmers on how to comply with the requirements of the Waste Disposal (Livestock Waste) Regulations. It sets out the precautions and actions which should be taken by livestock farmers in Livestock Waste Control and Restriction Areas to guard against dangers to public health and risks of pollution arising from the disposal of livestock waste.

The Code of Practice

4. During our consultation with the farmers in the past few years, they emphasised that they needed technical assistance in installing livestock waste treatment systems. After consultation with the Livestock Waste Disposal Consultative

Committee, five sets of guidance notes have been prepared and will be issued to assist farmers to select suitable treatment systems. These guidance notes supplement the COP by providing detailed design criteria of five treatment systems and explaining how these systems should be installed. In consequence of the preparation of these guidance notes, the existing COP for livestock waste management has to be amended as well to agree with these guidance notes. Livestock farmers have been consulted and notified that these guidance notes and COP will be published and available to them in both English and Chinese.

Proposed Revision

5. The proposed revision to the COP consists of the following major additions :

- o Introduce additional pollution preventive measures for free range livestock keeping

  "Section 5-Additional Pollution Preventive Measures for Free Range Farmers" and "Appendix 5-The Minimum Height Requirement of Bund Walls Downslope of Free Range Livestock Keeping Areas" will be added to provide guidance and directions to free-range livestock farmers engaged in free range livestock keeping, which is commonly employed in goose and duck keeping.

- o Introduce additional guidance information for installing soakaway systems

  "Appendix 4-Soakaway Area Requirements at Different Soil Percolation Rates" will be added to improve guidance and directions to those farmers who select to use soakaway systems to treat their livestock waste.

6. The text has also been revised to provide clearer guidance and more detailed directions on livestock waste management and on the related requirements of the Waste Disposal Ordinance and the Waste Disposal (Livestock Waste) Regulations.

Advice sought

7. Members are requested to endorse the proposed revision to the COP on livestock waste management attached to this paper.

Environmental Protection Department
May 1994

CODE OF PRACTICE :
LIVESTOCK WASTE MANAGEMENT
(Prepared and revised under section 35 of the Waste Disposal Ordinance)
(Cap 354)

Preface

Codes of Practice are prepared by the Secretary for Planning, Environment and Lands under section 35 of the Waste Disposal Ordinance after consultation with the Advisory Council on the Environment. Codes of Practice give guidance and directions as to the collection, storage, treatment, transportation and disposal of waste. Failure of any person to observe a Code of Practice shall not of itself render that person liable to criminal proceedings of any kind but any such failure may, in any proceedings whether civil or criminal and including proceedings for an offence under the Waste Disposal Ordinance, be relied upon as tending to establish or to negative any liability which is in question in those proceedings.

This Code of Practice gives guidance and directions as to the collection, storage, treatment, transportation and disposal of livestock waste generated or produced in or on livestock premises in a livestock waste control area or a livestock waste restriction area.

This Code of Practice has been revised in 1994 under section 35 of the Waste Disposal Ordinance and replaces the Code of Practice previously prepared by the then Secretary for Health and Welfare in 1988 in consultation with the then Environmental Pollution Advisory Committee.

Enquiries relating to this Code of Practice may be addressed to the Environmental Protection Department at :

Waste and Water Management Control Group
Environmental Protection Department
28/F., Southorn Centre,
130 Hennessy Road,
Wanchai
Hong Kong.

July 1994

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The Regulations referred to in this Code of Practice mean the Waste Disposal (Livestock Waste) Regulations made under section 33(1) of the Waste Disposal Ordinance (Cap. 354). The glossary of terms is in Appendix 1.

2.0 POLLUTION AND NUISANCE PROBLEM

Indiscriminate discharge of livestock waste has caused severe pollution in the watercourses in the New Territories. The decomposition of the organic component of livestock waste leads to rapid deoxygenation of water and results in the blackening of water, unpleasant odours, death of aquatic life and the formation of scum on water surface. The Regulations are designed to prevent uncontrolled discharge of livestock waste.

3.0 LIVESTOCK WASTE HANDLING

Livestock waste may be divided into two main categories, namely solid and liquid livestock waste. Solid livestock waste is mainly collected by means of dry mucking-out of livestock manure. Liquid livestock waste is mainly derived from hosing out by water (or treated effluent) of livestock excreta (wet mucking-out), or from washing livestock and livestock premises with water after dry mucking-out. The dry muck-out and wet muck-out practices are shown schematically in Figure 1 and Figure 2, respectively.

A livestock keeper should ensure that all livestock waste handling facilities and equipment including channels, drains, storage facilities, tanks, containers, bags, enclosures, soakaway-pits, etc. used, or intended for use, in or on his livestock premises are properly constructed, and maintained in a manner such that there is no risk of pollution arising from the livestock waste handling operations. A livestock waste handling facility or equipment may be considered properly constructed, within the meaning of this Code of Practice, when:

a) the livestock waste handling facility or equipment has been designed and constructed solely for its intended use; and
b) it is designed to prevent, so far as is practicable, any nuisance or annoyance to any person whether arising from odours, insects, vermin or from any other cause in connection with that livestock waste; and
c) it is constructed of material(s) of physical and chemical properties commonly known suitable for the intended use in the handling of livestock waste; and
d) good engineering practice is adopted wherever appropriate during fabrication, construction and installation; and
e) under normal use, the facility or equipment will not in anyway endanger life, or give rise to health hazard or risk of pollution.

A properly constructed storage container, storage bag or other storage facility should also have been designed to prevent so far as is practicable the spillage, leakage or escape of any livestock waste contained therein.

All livestock waste handling facilities and equipment, including channels, drains, tanks and pits, etc., should be covered to prevent ingress of rain, surface runoff and breeding of

flies and mosquitoes.

Should there be any risk of overflow or spillage from any of his livestock waste handling facilities or equipment, a livestock keeper should take all reasonable precaution and exercise all due diligence to avoid any overflow, spillage or pollution.

3.1 Temporary Storage of Solid Livestock Waste

Solid livestock waste, typically collected through practising the dry muck-out method, should be treated or taken off the livestock premises in accordance with the Regulations. Raw waste may be stored on the livestock premises prior to any treatment or disposal; depending on the manure collection technique adopted, the desired storage capacity should take into account the worst combination of expected conditions. However, unless on-farm treatment provisions such as on-farm composting are made, raw pig manure should be stored in portable storage containers and removed to and disposed of at a designated place of collection at least twice during any period of 7 days. In case of poultry manure, it should also be stored in portable storage containers and disposed of preferably once a week, except when the litter bedding method has consistently been adopted. With the litter bedding method, the frequency of manure removal would depend on the type of poultry and individual operation, but not less than once every two months is recommended.

Any solid livestock waste generated or produced from the *in-situ* composting operation should be stored by the livestock keeper in or on those properly constructed parts of the livestock premises in which that waste is composted and in such manner as not to cause any nuisance or annoyance to any person until such time as that waste is removed from those premises for its intended use or disposal. In any case, good management should be exercised at all times so that no nuisance or pollution is caused to the environment or to livestock premises or dwellings nearby.

The provision of storage containers for dry muck-out livestock waste is further specified in para. 7.1.

3.2 Collection and Disposal of Solid Livestock Waste

Solid livestock waste for collection and treatment should be separated from liquid livestock waste on the livestock premises in the following ways :

3.2.1 The solid livestock waste (mostly manure) should be collected by means of shovel, scraper or specially designed dung channels and placed in a properly constructed storage container. The solid livestock waste including any contaminated bedding material should either be composted on the livestock premises or be taken to a designated place of collection, and during such operations, the livestock keeper should make suitable arrangement and take all necessary precautions to avoid any spillage or pollution.

The livestock and livestock premises, which are still contaminated with livestock waste, should then be washed or hosed down, with a controlled use of water, to a properly constructed channel leading to a soakaway-pit for disposal or to a livestock waste treatment plant for treatment to the required standard specified in the Waste Disposal Ordinance before discharging into any nearby watercourse or receiving waters. All livestock waste treatment plants should be designed to achieve the minimum standard of a biochemical oxygen demand not exceeding 50 milligrams per litre of liquid livestock waste and a suspended solids content not exceeding 50 milligrams per litre of that waste, according to the Schedule in the Regulations. It is recommended that water usage should be controlled at no more than 15 litres per pig per day and 0.4 litres per chicken per wash.

3.2.2 Solid livestock waste collected from livestock premises and not intended for on-farm treatment or utilisation should be sent to a designated place of collection at intervals in accordance with para. 3.1 and emptied into the collection containers provided at the designated place of collection. It is advisable to give at least 24 hours notice to the Authority if disposal of a large quantity of solid livestock waste is necessary.

3.3 Collection and Disposal of Liquid Livestock Waste

Liquid livestock waste is derived mainly from hosing out by water of livestock excreta or from washing with water after dry muck-out from the livestock premises. It is necessary to control the usage of water for washing to avoid giving rise to an unnecessarily large volume of liquid livestock waste subsequently requiring treatment and disposal. Livestock premises should provide sufficient capacity of pits or tanks for storage of liquid livestock waste prior to treatment or disposal, and such storage pits or tanks should not cause nuisance or pollution of the environment. When a soakaway-pit is used, an excessive use of water will require the soakaway-pit to be made much larger or otherwise result in overflow by overloading the soakaway-pit. When a livestock waste treatment plant is used, an excessive use of water will require a larger plant and consequently increase both capital and running costs very substantially.

A livestock keeper shall dispose of any liquid livestock waste generated or produced in or on his livestock premises :

a) by means of a properly constructed and situated soakaway-pit, after the solid livestock waste has been removed; or
b) by discharging along or through properly constructed channels to a designated place of disposal for liquid livestock waste; or
c) by means of a propose-built collection vehicle, taking all necessary precautions to prevent the spillage, leakage or escape of such waste during

that operation, to a designated place of disposal for liquid livestock waste; or

d) by discharging along or through properly constructed channels into a soakaway-pit, a communal sewer, saline waters or a watercourse, after such waste has been treated in a livestock waste treatment plant to at least the minimum standard required in the Regulations.

All livestock waste treatment plant should be designed to achieve the minimum standard of a biochemical oxygen demand not exceeding 50 milligrams per litre of liquid livestock waste and a suspended solids content not exceeding 50 milligram per litre of that waste, according to the Schedule in the Regulations. It is recommended that water usage should be controlled at not more than 15 litres per pig per day and 0.4 litres per chicken per wash.

4.0 CONTROL REQUIREMENT FOR LIVESTOCK WASTE TREATMENT PLANT

In general terms, treatment of livestock waste can be described as any process which uses one or more stages of biological, chemical or physical changes to stabilize the raw waste or to reduce its polluting effect. Essentially, livestock waste after proper treatment can be disposed of or utilised without endangering the receiving environment. All livestock waste treatment plants should be properly designed, constructed, operated and maintained so as not to cause pollution to the environment.

All channels along or through which liquid livestock waste is discharged, after being treated to the minimum standard required in the Regulations, should be properly provided and maintained by the livestock keeper to ensure that these channels are kept in good order and free from breaks, cracks, holes or any other defects.

4.1 Soakaway-pit

A suitably designed and properly constructed soakaway-pit in accordance with para. 3.0 may be used for treating small volume of dilute liquid livestock waste, such as the liquid livestock waste generated from washing livestock or livestock premises (contaminated with livestock waste) after dry muck-out operations, or leachate from the composting of solid livestock waste. The soakaway-pit relies on the percolation of liquid livestock waste into the subsoil and it is, therefore, important not to exceed its design capacity. Liquid livestock waste should be allowed to percolate into the ground or subsoil without any overloading or overflow occurring. Appendix 4 illustrates the recommended maximum allowable loadings of soakaway pit and trench. The effectiveness of the soakaway-pit will be prolonged by prior removal of solids. As a general guide, it is a requirement that a soakaway-pit must not be situated less than 30 metres (or such other distance in substitution for 30 metres, and subject to such conditions, as may be specified in writing by the Authority by reference to any particular livestock premises) from any reservoir, saline waters, spring, watercourse or well for potable use.

4.2 Composting

Composting is a natural biological degradation process whereby heterogeneous organic matter, including solid livestock waste, is decomposed into simple or stable compounds by the action of micro-organisms and it should be carried out in a properly constructed enclosure in accordance with para 3.0. Raw waste, with or without the addition of bedding material or spent litter resulting from litter bedding method eg. Pig-on-Litter, should be prepared and placed inside the enclosure where it is allowed to undergo composting and to reduce the moisture content. Such enclosure should be constructed with a permanent roof and three surrounding walls to prevent ingress of rain. Properly constructed channels with covers should be provided along the periphery of the enclosure to prevent any ingress of surface runoff, and to intercept and collect any effluent generated during composting. Leachate and drainage from composting facilities should be either properly disposed of to a soakaway-pit or collected for treatment in a livestock waste treatment plant.

4.3 Lagooning

This is a biological livestock waste treatment plant which provides storage and treatment at the same time. Livestock keepers with sufficiently large space available within their livestock premises may handle their liquid livestock waste, especially wet muck-out slurry, by this means.

4.3.1 Aerobic Lagoon

Aerobic lagoon or oxidation pond is characterised by its relatively shallow depth which usually does not exceed 1.5 metres.

The treated effluent may be applied onto cultivated land or open fields where it could be completely assimilated. Any treated effluent can only be discharged to a watercourse, a communal sewer or saline waters if it has been treated to the minimum standard required, and is discharged along or through properly constructed channels.

4.3.2 Anaerobic Lagoon

This type of system does not require dissolved oxygen to break down the organic livestock waste matter and has no restriction on its depth. The lagoon should be constructed with an impervious lining and be located far from any residential areas (a minimum distance of 300 metres is recommended), such that it does not cause any nuisance or endanger nearby farming activities, underground water, watercourse or saline waters. Never overload the lagoon. For sufficient degradation and stabilization of livestock waste, the liquid slurry should, in general, be retained in the lagoon for over 200 days. The sludge accumulated in the system should be removed regularly and in any case should not take up more than half of the lagoon

volume. The sludge so removed should be properly disposed of in accordance with para. 4.4. In general, anaerobic lagoon can provide some 80 to 90 per cent reduction in biochemical oxygen demand, but it cannot treat liquid livestock waste fully to render it suitable for discharge into watercourses, communal sewers or saline waters, and hence a second stage of treatment is required.

4.4 Disposal of Livestock Waste Treatment Sludge

Sludge is a residual livestock waste generated from a livestock waste treatment plant. Para. 7.2 describes some specific requirements for the storage of sludge in liquid form. Such sludge may be dewatered on-farm either by drying, composting or mechanical means to reduce its moisture content and make it easier to handle prior to final disposal. Sludge should be properly dried before it may be disposed of as solid livestock waste to a designated place of collection. "Properly dried" means dried to a moisture content not exceeding 85 per cent by weight, such that it can be readily picked up by means of a shovel or similar tools; and that no water droplet can be squeezed out of such sludge upon pressing by hand. Alternatively, such sludge may be delivered in liquid form, by means of a purpose-built sludge tanker, to a designated place of disposal for liquid livestock waste.

5.0 ADDITIONAL POLLUTION PREVENTIVE MEASURES FOR FREE RANGE LIVESTOCK KEEPING

Livestock waste accumulating on land used for free range livestock keeping should be regularly removed. The land area itself should not be impermeable, so that any residual waste may be assimilated.

All free range livestock keeping areas shall be provided with an impermeable barrier or bund to prevent the direct runoff of the polluted first flush of rainwater. The barrier or bund shall be capable of retaining all rainwater that falls onto these areas during the first 15 minutes of an average rainstorm with a return period of not more than two years. In general, the provision of a bund wall along the downslope perimeter of the livestock premises would be sufficient. The minimum height requirement of this bund wall is specified in Appendix 5.

6.0 UTILISATION OF LIVESTOCK WASTE

Any solid livestock waste generated or produced in or on any livestock premises in a livestock waste control area or a livestock waste restriction area shall, in the case of livestock waste intended for use as fertilizer or soil conditioner in landscaping schemes, agriculture, horticulture, forestry or for the production of animal feedstuffs or fishmeal, be stored by the livestock keeper in or on those premises ---

(i) in properly constructed enclosures used solely for composting or drying that waste and designed to prevent so far as is practicable the spillage, leakage or escape of that waste; or

(ii) where such waste is the subject of *in situ* composting, in or on those properly constructed parts of the livestock premises in which that waste is composted; and

(iii) in such manner as not to cause any nuisance or annoyance to any person whether arising from odours, insects, vermin or from any other cause in connection with that waste,

until such time as that waste is removed from those premises whether by the livestock keeper or otherwise for such use or production.

Any raw manure or manure compost that is not utilised must be properly disposed of as solid livestock waste.

6.1 Land Application of Livestock Waste

The practice of this method is relatively straightforward but requires good planning and management. Livestock waste is rich in plant nutrients (Nitrogen, Phosphorus and Potassium). Raw or treated waste may be applied onto arable farmland to help maintain the soil fertility, provided that adequate precautions are taken to prevent causing any nuisance or pollution.

Diluted livestock excreta may be applied onto crop land, vegetated land or half-grown crops as top dressing. Spreading of manure and waste onto arable land must not exceed the uptake capacity of the crop.

Where large quantity of manure is produced, exceeding that required for on-farm land application, arrangement could be made, if possible and agreeable with the neighbours concerned, to spread it onto neighbouring crop growing land as a crop fertiliser. It is advisable to secure the agreement of the neighbours concerned well in advance to enable the amount of land available for such application and the amount of livestock excreta that could be utilised to be correctly estimated.

Land application of livestock waste should be carried out in such a manner so as not to cause any risks of water pollution. The maximum amount and rate of application of livestock waste as a fertiliser is strictly governed by plant nutrient requirement, soil conditions, location of site, and quality of the given waste. Good management must be exercised and care must be taken to avoid over-application in any case. Excessive application of livestock waste on land would result in the need to collect the livestock waste that is not assimilated for proper disposal in accordance with para. 3.2 and 3.3.

6.2 Red Worm Breeding

Any wastewater arising from red worm breeding using livestock waste as feedstuff should not be discharged into any watercourse, communal sewer or saline waters unless it has been treated to the minimum standard required and is discharged along or through properly constructed channels.

6.3 Pond Fish Culture

Any water arising from fish ponds fertilised with livestock waste should not be discharged into any watercourse, communal sewers or saline waters unless it has been treated to the minimum standard required and is discharged along or through properly constructed channels.

7.0 COLLECTION AND TRANSPORTATION

Good livestock waste control practices make the final disposal operation an easier task. Irrespective of the dry muck-out or wet muck-out methods used, livestock waste, treated or untreated, requires collection and transportation for final disposal. Storage, collection and transportation of livestock waste should be well planned and coordinated to avoid causing any nuisance or pollution of the environment.

7.1 Storage Containers and Bags

A livestock keeper should ensure that the storage containers used, or intended for use, in or on his premises are kept in good order and repair and free from breaks, cracks, holes or any other defects. All storage containers should be leakage proof, properly designed to prevent ingress of rainwater, and constructed of robust and corrosion resistant material such as hot dip galvanized steel or hard wearing plastic. Such storage containers should have a cover that would effectively minimise odour emission and intrusion of insects and rodents, and have handles such that it can be readily moved or manipulated or lifted by a normal adult in normal use, even when the container is fully loaded.

For easy handling, the capacity of storage containers should be in the region of 25 to 50 litres each and the number of storage containers required for storage and delivery of dry muck-out manure from the livestock premises to the designated place of collection should accord with Appendices 2 and 3. Livestock keepers should ensure that they are adequately equipped to take necessary precautions against any unforeseen circumstances, and that there is always enough storage containers to hold all the solid livestock waste that may be generated or produced in or on the livestock premises and requires storage. Livestock keepers who make their own arrangement for collection and transportation of solid livestock waste, may use larger containers such as skips, provided that the total capacity is not less than the minimum requirement as specified in Appendices 2 and 3.

Poultry waste collected from dry muck-out operation and placed in polypropylene woven storage bags for recycling or selling purpose should be properly covered with tarpaulin during storage and transportation to avoid causing any nuisance. Poultry waste stored in storage bags should not be sent to the designated place of collection.

Livestock keepers should ensure that the storage containers and storage

bags are used for the storage of livestock waste and for no other purpose, and that no spillage or leakage occurs during storage and transportation.

7.2 Storage of Livestock Waste Treatment Sludge

Pits or tanks for handling livestock waste treatment sludge in liquid form should be sized according to the waste output for which they must provide total containment, and should be properly designed for the resultant hydraulic load. Local soil condition should be checked prior to installation of any storage pits or tanks, and in case of doubt, suitable advice should be sought. These storage pits or tanks should be accessible to a purpose-built sludge tanker and should have a suitable opening located within reach for the removal and emptying operations, unless such operations are to be performed by other environmentally acceptable means.

8.0 LIVESTOCK KEEPER'S OBLIGATION TO REPORT PLANT FAILURE

All livestock waste treatment plant shall be operated and maintained in good running order. In the event of a breakdown of a livestock waste treatment plant, or any failure of any component of the treatment plant which may cause the plant to fail to meet the minimum standard required in the Regulations, the following action should be taken :

Livestock keepers should report the breakdown, irrespective of its cause, to the Authority as soon as practicable, but in all cases within a period of 48 hours. At the same time, the livestock keeper should take all reasonable measures and exercise all due diligence to repair the plant and bring it back into operation.

Glossary of Terms

aerobic process	:	a process which requires oxygen to proceed.
anaerobic process	:	a process which proceeds in the absence of oxygen.
Authority	:	means the Director of Environmental Protection.
biochemical oxygen demand (BOD)	:	the amount of dissolved oxygen consumed by microbiological action when a sample is incubated for 5 days at 20°C in accordance with the analytical method as specified in the British Standards 6068:Section 2.14:1984.
channel	:	a conduit, pipe or trench used for the movement or passage of liquid livestock waste in, on or outside livestock premises.
communal sewer	:	a sewer that is not used exclusively by one discharger.
composting	:	a natural, artificial, chemical or biological degradation process whereby heterogeneous organic matter decomposes into simple or stable compounds by the action of micro-organisms and "composted" shall be constructed accordingly.
designated place of collection	:	a place designated by the Authority as a place where solid livestock waste generated or produced in or on livestock premises is to be conveyed and collected for transportation to a designated place of disposal.
designated place of disposal	:	a place designated by the Authority as a place to which livestock waste is to be transported for disposal, and includes a livestock waste treatment plant not situated in or on livestock premises.

enclosure	:	an area in or on livestock premises enclosed by a fixed structure on at least 3 sides (with or without a doorway), roofed over and made of wood or such other materials as the Authority may approve.
exempt person	:	any person or any classes of person specified in the Fourth Schedule of the Waste Disposal Ordinance.
free range livestock keeping	:	the keeping of livestock either wholly or partially in an outdoor environment.
free range livestock keeping area	:	any area used for keeping of livestock either wholly or partially in an outdoor environment.
handling	:	includes any utilisation, collection, storage, treatment, transportation or disposal.
in-situ composting	:	composting initiated or assisted by the movement of livestock, machinery or other mechanical apparatus in or on those parts of livestock premises in which livestock waste is generated or produced by that livestock.
keep	:	includes breed, house, tend, look after or control and "kept" and "keeping" shall be construed accordingly.
licensed contractor	:	any person who is granted a licence under section 10 of the Waste Disposal Ordinance to provide services for all or any of the matters referred to in section 9 of the Waste Disposal Ordinance.
liquid livestock waste	:	the urine of any livestock; or any livestock waste which flows, spreads or otherwise behaves as a liquid; or the mixture of any liquid with solid livestock waste whether or not that liquid originates as livestock waste, has been treated under regulation 8(2) or contains any solids in suspension; or any pigwash contaminated by livestock waste; or

any liquid used to bathe or wash livestock contaminated with livestock waste; or

any liquid used to wash or clean any livestock premises contaminated by livestock waste.

litter bedding method: a type of livestock husbandry method for which the livestock is farmed on a specially prepared bed or specially designed livestock keeping structure such that livestock waste deposited and accumulated thereof only requires removal infrequently.

livestock : pigs or poultry.

livestock keeper :

(a) an owner of livestock; or

(b) an owner, lessee or occupier or person responsible for the management of livestock premises; or

(c) any person keeping livestock or having the custody or possession of livestock; or

(d) any former livestock keeper,

but does not comprise exclusively any exempt person.

livestock premises :

(a) any premises, buildings, land or land covered by water owned, leased or occupied by a livestock keeper, his dependants or employees for the purpose of keeping livestock and any dwelling-place and ancillary buildings or structures connected therewith;

(b) any other premises in or on which livestock are kept other than any premises comprising any abattoir, slaughter-house, market, fresh provision shop, lairage or hatchery in which poultry of not more than 12 days old are kept; and

(c) any former livestock premises.

livestock waste : means, subject to section 2A of the Waste Disposal Ordinance, animal waste produced by, or connected with, livestock.

livestock waste control area : a livestock waste control area specified in the second column of the Second Schedule of the Waste Disposal Ordinance by

reference to maps identified therein and signed by the Director, an officer of the Environmental Protection Department not below the rank of Environmental Protection Officer or a Chief Environmental Protection Inspector and deposited with the Land Registry.

livestock waste prohibition area	:	a livestock waste prohibition area specified in the second column of the First Schedule of the Waste Disposal Ordinance by reference to maps identified therein and signed by the Director, an officer of the Environmental Protection Department not below the rank of Environmental Protection Officer or a Chief Environmental Protection Inspector and deposited with the Land Registry.
livestock waste restriction area	:	a livestock waste restriction area specified in column 2 of the Fifth Schedule of the Waste Disposal Ordinance by reference to maps identified therein and signed by the Director, an officer of the Environmental Protection Department not below the rank of Environmental Protection Officer or a Chief Environmental Protection Inspector and deposited with the Land Registry.
livestock waste treatment plant	:	a waste treatment plant at which livestock waste is treated by biological, chemical, physical or other means or any combination thereof in accordance with regulations made under section 33 of the Waste Disposal Ordinance.
minimum standard required	:	the minimum standard to which livestock waste is to be treated according to the Schedule in the Regulations.
on-farm	:	within the livestock premises.
poultry	:	chickens, ducks, geese, pigeons and quail.
properly constructed	:	means properly constructed in accordance with the standard specified in this Code of Practice and of such materials and of such design or type as may be prescribed in this Code of

Practice.

properly dried : dried to a moisture content not exceeding 85% by weight.

raw waste : any livestock waste prior to treatment.

Regulations : the Waste Disposal (Livestock Waste) Regulations made under section 33 of the Waste Disposal Ordinance (Cap. 354).

relevant date : (a) in the case of a livestock waste prohibition area, the date shown in the third column of the First Schedule of the Waste Disposal Ordinance in respect of that area; or

(b) in the case of a livestock waste control area, the date shown in the third column of the Second Schedule of the Waste Disposal Ordinance in respect of that area; or

(c) in the case of a livestock waste restriction area, the date shown in the third column of the Fifth Schedule of the Waste Disposal Ordinance in respect of that area.

saline waters : the waters adjacent to the coast of Hong Kong.

soakaway-pit : a pit or sump properly constructed in or on livestock premises for the purpose of allowing liquid livestock waste generated or produced in or on those premises to percolate into the adjacent ground or subsoil without any overload or overflow occurring, and includes any adits, pipes or trenches used in conjunction therewith to increase the rate of percolation.

solid livestock waste : the manure of any livestock, whether or not that manure has been mixed with other materials or composted; or
liquid livestock waste from which the liquid has been drained, separated or removed; or
the properly dried sludge or other solids produced by the treatment of liquid livestock waste under regulation 8(2).

storage bag : any bag or other similar article of sufficient strength and

durability as the Director may approved provided by a livestock keeper for the purpose of -:

(a) storing livestock waste generated or produced in or on livestock premises by, or in connection with, poultry; and

(b) conveying that waste within those premises; or

(c) removing that waste from those premises on the sale or transfer of that waste to any person,

but does not include any storage container.

storage container : any container, bin or other receptacle provided by a livestock keeper for the purpose of -:

(a) storing livestock waste generated or produced in or on livestock premises; and

(b) conveying that waste to a designated place of collection.

storage facility : any facility including containers, pits and tanks, for the temporary storage of livestock waste.

suspended solids(SS) content in the liquid : the amount of solids suspended in the liquid as measured in accordance with the analytical method as specified in the Standard Methods for the examination of water and wastewater 17th Edition (1989) by American Public Health Association.

wash : a complete operation of washing, bathing or cleaning livestock or livestock premises.

watercourse : any brook, creek, drain (whether natural or man-made), nullah, river or stream but does not include any channel or communal sewer.

Appendix 2

Requirement of Storage Containers
for
Solid Livestock Waste
(Pig Farms)

TYPE OF PIGS	MINIMUM NO. OF STORAGE CONTAINERS REQUIRED (BASED ON 22.5 LITRE CAPACITY CONTAINERS)			
	FOR 1 DAY STORAGE	FOR 2 DAYS STORAGE	FOR 3 DAYS STORAGE	FOR 4 DAYS STORAGE
BOAR	1 per 6 pigs	1 per 3 pigs	1 per 2 pigs	1 per 1 pig
SOW	1 per 6 pigs	1 per 3 pigs	1 per 2 pigs	1 per 1 pig
PORKER/ROASTER	1 per 20 pigs	1 per 10 pigs	1 per 6 pigs	1 per 4 pigs
PIGLET(WEANER)	1 per 110 pigs	1 per 55 pigs	1 per 30 pigs	1 per 22 pigs

Appendix 3

Requirement of Storage Containers
for
Solid Livestock Waste
(Poultry Farms)

TYPE OF POULTRY	MINIMUM NO. OF STORAGE CONTAINERS REQUIRED (BASED ON 22.5 LITRE CAPACITY CONTAINERS)			
	FOR 1 DAY STORAGE	FOR 2 DAYS STORAGE	FOR 3 DAYS STORAGE	FOR 4 DAYS STORAGE
CHICKEN i) breeder ii) layer iii) broiler	 1 per 150 birds 1 per 150 birds 1 per 300 birds	 1 per 75 birds 1 per 75 birds 1 per 150 birds	 1 per 50 birds 1 per 50 birds 1 per 100 birds	 1 per 35 birds 1 per 35 birds 1 per 75 birds
DUCK	1 per 150 birds	1 per 75 birds	1 per 50 birds	1 per 35 birds
GOOSE	1 per 150 birds	1 per 75 birds	1 per 50 birds	1 per 35 birds
PIGEON	1 per 650 birds	1 per 325 birds	1 per 215 birds	1 per 160 birds
QUAIL	1 per 1400 birds	1 per 700 birds	1 per 470 birds	1 per 350 birds

Appendix 4

Soakaway Area Requirements
at Different Soil Percolation Rates

Time for water to fall 150mm in test pit (minutes)	Minimum required trench bottom area (m^2) per 1,000L/day of wastewater	Minimum required pit percolation area (m^2) per 1,000L/day of wastewater
6 or less	31	23
12	38	29
30	51	38
60	72	53
180	152	111

Note

1. This table is only applicable to small inland duck farms or those poultry or pig farms intending to carry out dry muck-out of livestock waste.

Percolation test procedures :

1. Excavate a hole 300mm square to the proposed depth of the pit and trench.

2. Fill the hole with approximately 150 mm of water and allow to seep away completely.

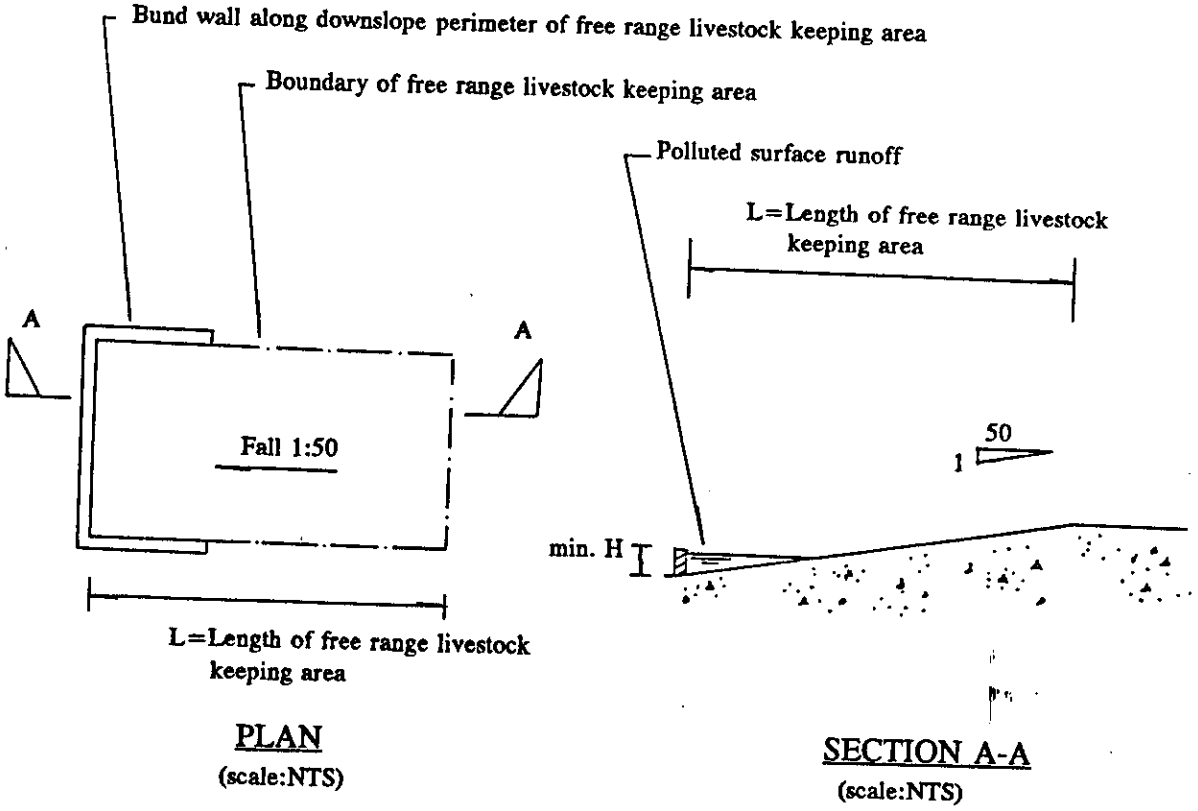
3. Refill the hole with water to a depth of 150 mm and observe the time in minutes for water to seep completely away.

Appendix 5

The Minimum Height Requirement of Bund Walls Downslope of Free Range Livestock Keeping Areas

FALL	THE MINIMUM HEIGHT(H) REQUIREMENT OF BUND WALLS AT VARIOUS LENGTH OF FREE RANGE LIVESTOCK KEEPING AREA		
	L = 100m	L = 75m	L ≤50m
1:100	125mm	125mm	100mm
1:75	150mm	125mm	100mm
1:50	175mm	150mm	125mm
1:25	225mm	225mm	175mm

Typical layout



PLAN
(scale:NTS)

SECTION A-A
(scale:NTS)

Figure 1 Dry Muck-out Practice

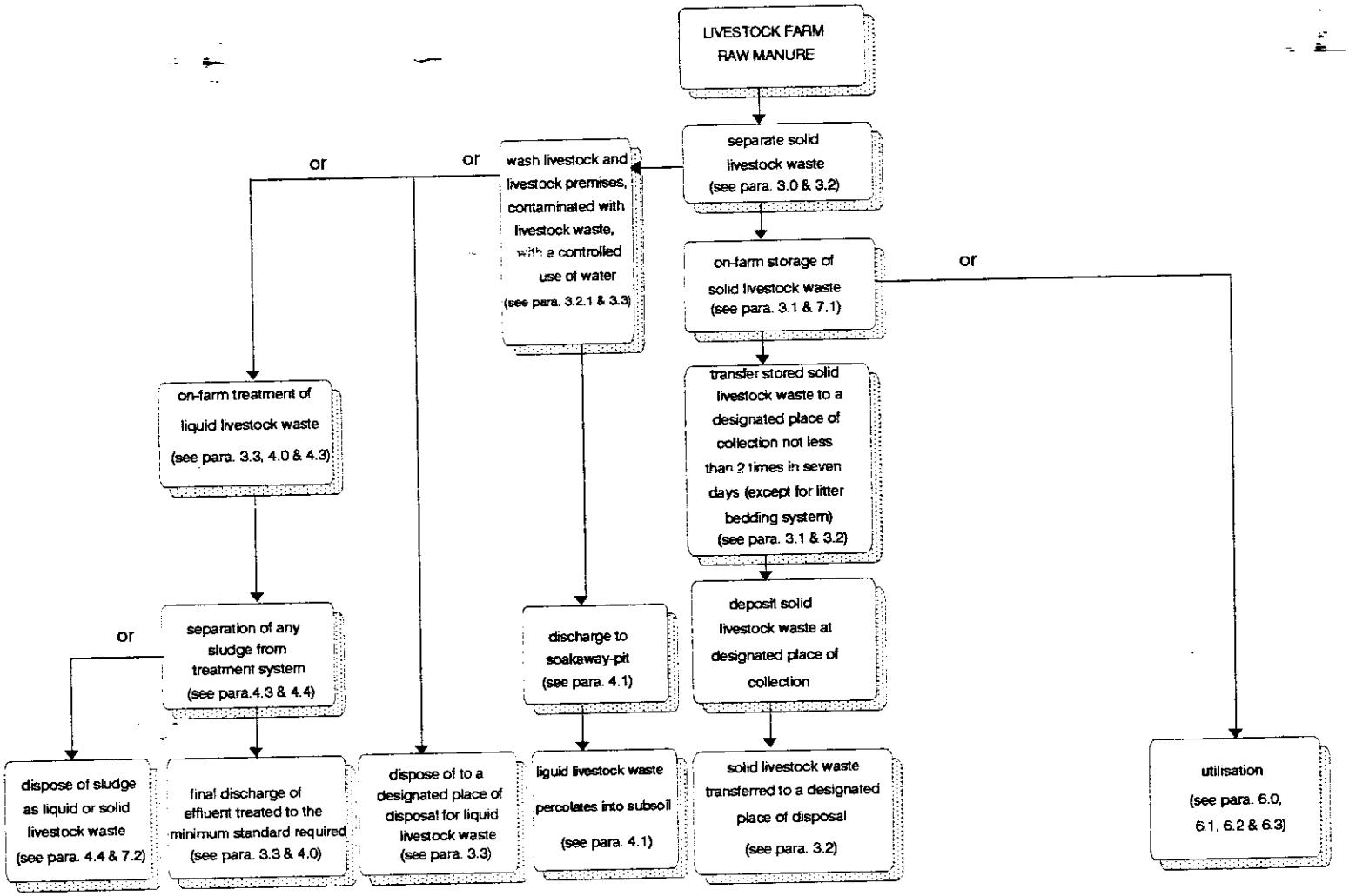


Figure 2 Wet Muck-out Practice