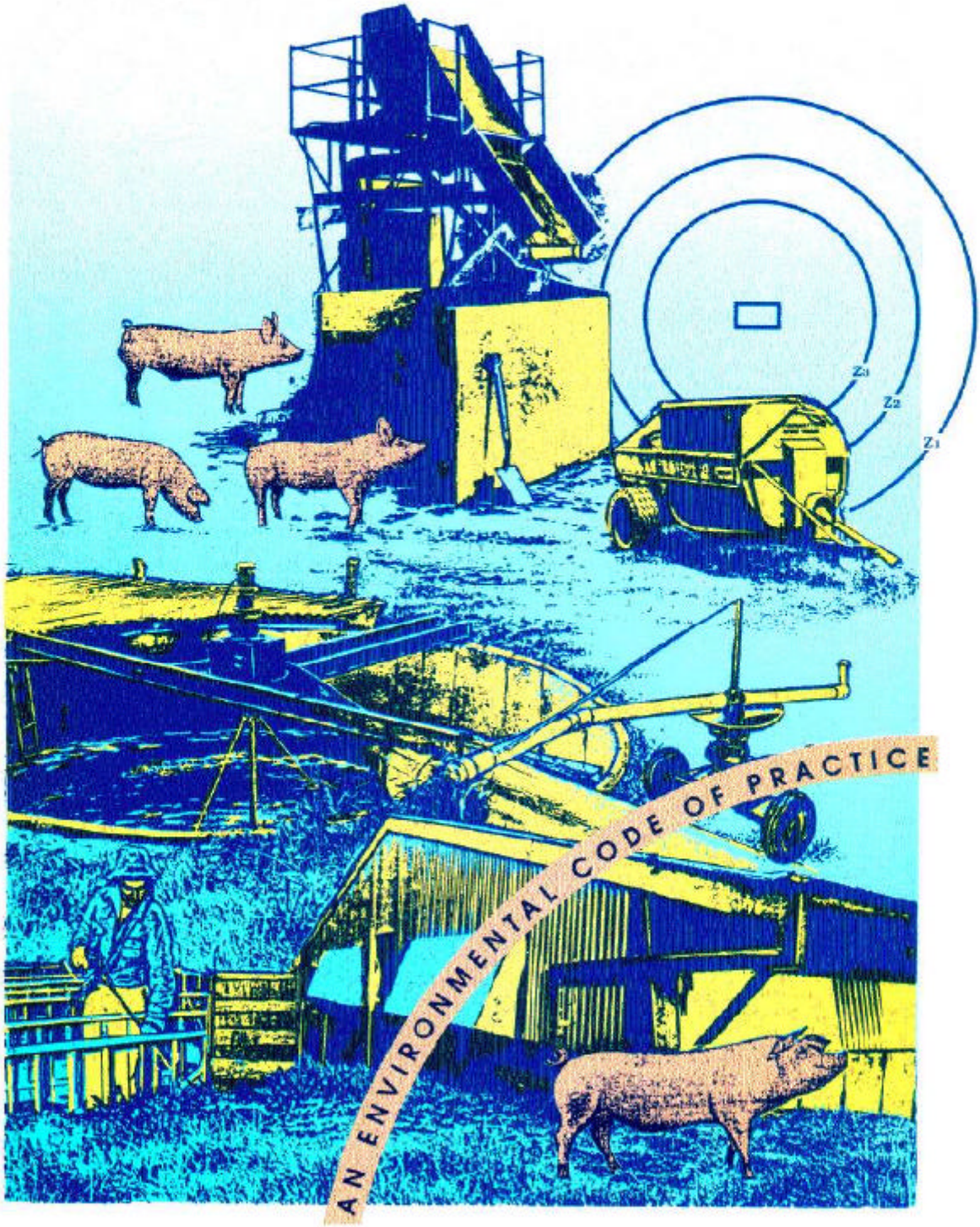
CODE OF PRACTICE
PIGGERIES

REVISED 1992



Department of Planning and Housing

Department of Food and Agriculture

CODE OF PRACTICE

PIGGERIES

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In consultation with
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Environment Protection Authority
Victorian Farmers' and Graziers' Association (Pig Branch)
Australian Institute of Health Surveyors (Victorian Division)
Victorian Pork and Bacon Council
Soil Conservation Authority

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REVISED 1992,
By the Technical Advisory Committee involving

Department of Food and Agriculture
Department of Planning and Housing
Environment Protection Authority
Health Department, Victoria
Victorian Farmers Federation (Pig Commodity Group)
Australian Institute of Environmental Health (Victorian Division)

(The Technical Advisory Committee was appointed to provide for an ongoing review of the Code of Practice - Piggeries. The Committee reports through the Minister of Agriculture to the Minister of Planning and Housing).

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APPENDICES

1.0 GENERAL REQUIREMENTS FOR ESTABLISHING A PIGGERY

1.1 INTRODUCTION

The Code of Practice - Piggeries specifies minimal standards that apply to new piggeries or where there are substantial modifications to existing piggeries (see Note 1 and Note 2).

This Code of Practice - Piggeries and the companion volume entitled Guidelines for the Siting and Operation of Piggeries (see Note 2) are designed to assist municipal councils, pig producers and planning authorities in the proper establishment and operation of new piggeries or where there are major modifications to existing piggeries.

It is in the interest of the producer, the pig industry and the general community that piggeries are established and managed efficiently, with minimal environmental impact and disturbance to the local area.

Potential producers and other persons having an interest in the establishment and control of piggeries are advised to contact the responsible municipal authority at an early stage to ascertain any local by-laws/regulations relating to piggeries.

Constant developments in husbandry techniques, animal welfare and utilisation of effluent will ensure continuing improvements in environmental standards. Every encouragement is therefore given to innovators who, on sound practical or technical advice, introduce new or improved techniques.

Effluents from agricultural operations are valuable resources, which only become "wastes" if the operator or community fails to utilise such assets. In the future these resources may become as much a part of the overall economic system as the actual production of animal protein for human consumption.

Throughout this Code of Practice the total number of pigs registered is known as the "R-value". For this purpose any living pig from birth onwards is defined as a pig (see Note 3).

The Code of Practice does NOT cover detailed aspects of animal husbandry and design and operational requirements of piggeries. Responsible authorities and potential pig producers should refer to the Guidelines document and other publications on pig production.

Note 1 - This applies to existing piggeries where planning approvals to the responsible authority for substantial modifications (allowing for an additional 10% or greater increase in pigs) occur on or after February 26, 1988.
Refer to Land Protection Act 1970, State Environmental Protection Policy, Waters of Victoria.

Note 2 - A companion volume titled Guidelines for the Siting and Operation of Piggeries will provide additional material to assist both new and existing piggeries.

Note 3 - While it has been common practice to refer to the size of a piggery in terms of "sow-units", currently many piggeries operate as "breeder-only" or "grower-only" units, which makes the "sow-unit" a meaningless term.
A modified R-value applies specifically to "breeder-only" piggeries - see Section 2.2.

1.2 TOPOGRAPHY

The site should be on undulating or flat terrain to minimise soil erosion. When the proposed disposal area, or part thereof, contains land which has a slope of 10% or greater, a check shall be made to determine whether there is sufficient land of a lesser grade which is capable of absorbing all the effluent which will be produced from the piggery on a year round basis. Where there is insufficient land available provision shall be made for an alternative system (e.g. a lagoon) which will have sufficient capacity to retain or treat the excess effluent. This will not preclude the use of other more steeply graded land when conditions are favourable but if land of slopes greater than 10% is used for disposal then provision shall be made to minimise erosion.

1.3 SOILS

(Although not a specific item of this Code of Practice, soils should ideally be a medium loam-clay to provide reasonably good drainage and retention of nutrients (e.g. nitrogen and phosphorus). Sandy soils offer good surface drainage but effluent disposal on them is liable to cause pollution of aquifers or underground waters, due to the non-retention of nutrients in the soil).

The slope of the soil affects the rate at which effluent can be applied, but does not affect the evapotranspiration (which depends on climate conditions, see section 7.3 and appendices 1 and 2).

1.4 LAND LIABLE TO FLOODING

No piggery shall be established on land that is liable to flooding, as defined by a flood frequency of 1 in 50 years. Information on flood frequency of 1 in 100 years is more readily available and this should be used in the absence of information on flood frequency of 1 in 50 years (see Note 1).

No piggery effluent shall be spread or deposited onto any land that is liable to flooding at a frequency of greater than 1 in 5 years.

Where flood frequencies are greater than 1 in 10 years the establishment of a disposal site shall be at the discretion of the responsible authority.

1.5 FUTURE EXTENSIONS TO A PIGGERY

According to this Code of Practice a piggery can be established up to a specified maximum size (the "R-value"), which is also limited by buffer zone distances. Buffer zones also exist for the disposal of piggery effluent and either piggery **or** effluent disposal buffer zones may be the limiting factor to expansion.

Compliance with the Code of Practice is required for existing piggeries to undertake further modifications which provide for an increase of more than 10% in pig numbers (see Note 2).

Note 1 - The Rural Water is a reliable source of flood frequency information.

Note 2 - The total of a 100% increase in pig numbers will normally be calculated with reference to the pig numbers previously permitted by the responsible authority.

1.6 FENCING

All piggeries shall be constructed so as to prevent any animal escaping from the pig compound. Fencing shall be pig-proof. Electric fences shall not be deemed to satisfy the above requirement.

An intensive piggery shall be deemed to meet the requirements, if the perimeter building wall is pig-proof to a height of 1000 mm, the pigs are kept in pens, the building has operating doors, and is enclosed in a pig-proof fence and gate compound or has self closing doors.

Piggeries classified as extensive or semi-extensive shall have fencing and/or walls that are continued below ground level (depending on local soil conditions) to such a depth that no pig can burrow beneath the fencing. All fencing or walls shall have a minimum height of 1000 mm above ground level.

1.7 STOCK RECORDS

An accurate and up-to-date record shall be kept showing the monthly numbers of all stock within the piggery (see Note 1), except where the piggery is solely registered as a "breeder-only" unit, in which case weekly numbers shall be required.

"Stock" shall include all pigs from birth to maturity.

1.8 STOCK IN EXCESS OF THE PERMITTED MAXIMUM

The maximum registrable number (the "R-value") of pigs shall not be exceeded except in circumstances that are wholly outside the control of the proprietor and his direct employees. In these exceptional cases the R-value may be increased to an absolute maximum of 115% R.

This stock overloading shall be permitted for a period that does not exceed in total an aggregate of 28 days over the immediately preceding 365 days.

Stock numbers in excess of the maximum registrable value (or 115% R, as provided above), caused solely by **unavoidable** circumstances, shall be allowed or disallowed at the discretion of the responsible authority.

1.9 WATER SUPPLIES

An adequate water supply shall be provided to meet all the requirements of the piggery when it is operating at its maximum ("R-value") level.

1.10 RE-USE OF WASTE WATERS

Any waste water (which also includes slurries) or solids that are discharged off the premises and subsequently re-used (e.g. to irrigate a neighbour's property) shall conform to all Regulations.

Note 1 - Most pig production recording systems would meet this requirement.

2.0 PIGGERY CLASSIFICATIONS

2.1 PIGGERY CLASSIFICATIONS

A piggery shall be classified according to the space actually occupied, or designated for occupation, by pigs (see Note 1).

Classification	Area (Stocking Density) m^2 per pig
Intensive	Fewer than 2
Semi-intensive	2 to 40
Semi-extensive	41 to 600
Extensive	More than 600

2.2 "BREEDER-ONLY" CLASSIFICATION

A "Breeder-only" piggery is defined as a piggery in which the progeny of breeding animals are removed from the piggery at or before the age of 70 days. To qualify for this classification, the "breeder-only" piggery must be the only type of piggery on the property.

The R-value for a "breeder-only" piggery shall be five times the number of stock aged 71 days and over (i.e. five times the normal breeding stock plus any "residual" progeny).

Note 1 - When land is assigned to both pigs and other stock, the true area occupied by pigs shall be determined after a reduction in area has been made for the other stock according to the following scale.

(1) Locally accepted values **or**

(2) The following table

Stock	No. per ha
Cattle	1.5
Cow and calf	1.0
Sheep or goats	7
Poultry	225

3.0 DEFINITIONS USED IN BUFFER ZONE TERMINOLOGY

The following definitions apply to all buffer zones:-

Bank full discharge level means the maximum level to which the water surface of a watercourse may reach before overtopping of a bank begins.

"Breeder-Only" piggery means a piggery in which the progeny of breeding animals are removed from the piggery at or before the age of 70 days. There shall be no other type of piggery on the property.

Constrained winds means a wind having a speed of 6 knots or more which is forced to blow in a confined path due to the presence of topographical features, e.g. a narrow valley.

Dispersed piggery means a piggery which, while being intensive in the nature of its operation, is so scattered in its layout that a piggery compound cannot be defined.

Domestic water supply channel means a water course which has been defined by the responsible authority as a "domestic water supply channel".

Farmhouse (not on the reference piggery property) means a residence on a property where stock are kept.

Fixed buffer distance means a distance, measured from a piggery or its associated operations, which is independent of the size of this piggery.

Irrigation supply channel means a watercourse which contains water that is for non-potable purposes, and has been defined by the responsible authority as an "irrigation supply channel".

Isolated rural residence means any residence that is situated on land not defined as a rural residential zone, residential area, or within a township boundary and not carrying out any agricultural activity involving stock.

Katabatic wind means a wind (or a component thereof) directed down the slope of a hill caused by a higher density of air near the slope than that some distance away from that slope.

Land area used for waste disposal means land used for the application of treated or untreated wastes which may or may not be owned by the piggery operator.

Major watercourse means a watercourse which has been defined by the responsible authority as a "major watercourse".

Major water storage means a water storage for domestic purposes which has been defined by the responsible authority as a "major water storage".

Piggery means any building, enclosure or yard in which 4 or more pigs are kept, bred, reared or fattened.

Piggery Compound means the area enclosed by a piggery perimeter and having a piggery reference point.

Piggery reference point means a single point, the geographical co-ordinates of which are defined, and from which variable buffer zone distances are measured. Using the relationship that one (1) R-value unit is equivalent to 1 metre; a piggery reference point is established when the piggery perimeter does not exceed:-

(a) 40% R and

(b) the length of the longest side does not exceed 15% R and

(c) the length of the shortest side is not less than 5% R.

Then the centroid of the piggery perimeter is defined as the piggery reference point.

Piggery perimeter means a line circumscribing the extremities of a piggery, within which line all pig housing and animal enclosures are contained.

Premises means buildings, land and hereditaments of every tenure; and also any machinery, plant, appliance or vehicle used in connection with any trade carried out on the premises.

Prevailing wind means any wind that blows from a given direction (±40 degrees) and at a speed of 6 knots or more in a period of more than 250 days in any one year; or alternatively in a given direction (± 40 degrees) for 30 consecutive days.

Proclaimed township boundary means the boundary defined by planning authorities as the lateral extent of the township, but modified to exclude those areas where stock are kept or are permitted to be kept.

Property means all the land comprised in an allotment, or allotments in the same ownership, that adjoins each other, or that are separated only by a stream, stream reserve or a non-major road.

Residential area means land that has been zoned and is developed, or in the course of development for housing purposes, but excluding those areas where stock are kept or are permitted to be kept.

Rural residential zone means a zone in which land has been set aside for limited residential development in a semi-rural or open environment (see Note 1), but excluding those areas where stock are kept or are permitted to be kept.

R-value (as defined previously) means the maximum registered number of pigs permitted in a piggery at any one time. A "breeder-only" piggery shall have an R-value equivalent to five times the number of pigs aged 71 days or more.

Significant topography means any terrain within 3 km of a piggery reference point or piggery perimeter, the elevation of which is 250 metres or more above the highest datum level of that piggery.

Note 1 - In Victoria, the zone will correspond with the boundary of rural residential-type zones shown on land-use planning maps.

Standard piggery means a piggery that uses good management techniques and -

(i) the buildings of which are naturally ventilated and odours are, or can be, emitted from side-openings or roof-ventilators without treatment; and

(ii) the buildings of which are cleansed (manually or mechanically) of effluent from the confines of the building at least once a week; and

(iii) the effluent of which could be expected to be substantially anaerobic at the time of removal.

Stock means any bull, cow, ox, calf, stallion, mare, gelding, foal, ass, mule, camel, ram, ewe, wether, lamb, pig, goat, dog or other animal or bird (other than a cat, dog, or bird kept solely as a domestic pet).

Variable buffer zone distance means a horizontal distance measured between a piggery reference point, or piggery perimeter and specified residential complexes. The distance is (within certain limits) proportional to the R-value of the piggery.

Watercourse means any surface waters of the policy area both perennial and intermittent and includes any river, stream, reservoir, billabong creek, anabranch, canal, wetland, channel, lake, lagoon, dam, natural or artificial water course, bay, coastal or tidal waters, and excludes waters within waste treatment systems, waters within enclosed water supply distribution systems, farm dams, private ponds, piped or underground drains and the interstitial water of sediments.

Watertable means the planar surface between the zone of saturation and the zone of aeration. It is also known as the free water elevation, free water surface, groundwater level, groundwater surface, groundwater table, level of saturation, phreatic surface, plane of saturation, saturated surface, water level, or water line. It shall not include a perched watertable.

Watertable-perched means the watertable or upper surface of a body of groundwater that is unconfined and separated from an underlying main body of groundwater by an unsaturated zone. A perched watertable is also known as an apparent watertable.

4.0 BUFFER ZONE DIMENSIONS (DISTANCES) FOR A PIGGERY

4.1 FIXED AND VARIABLE BUFFER ZONES

Buffer zones are established around a piggery and consist of two parts -

(1) Fixed and

(2) Variable

A variable buffer zone shall have an assigned horizontal distance that is determined according to the size of the piggery and the nature of the surrounding conditions. These distances shall be measured from the piggery reference point, when provided; otherwise from the nearest point on the piggery perimeter to a defined feature.

Variable buffer zones shall be established between the piggery (or pig unit) and the following features -

(a) Proclaimed township boundary (Zone 1_A)

(b) Rural residential zone/residential area (Zone 1_B)

(c) Isolated rural residence (Zone 2)

(d) Farmhouse (not on the same property as the piggery)(Zone 3)

In certain circumstances Zones 1_A and 1_B may be combined and then shall be referred to as Zone 1.

4.2 REDUCTION IN VARIABLE BUFFER ZONE DIMENSIONS (DISTANCES)

A variable buffer zone dimension may be reduced only when the piggery achieves **and maintains** conditions of a higher quality and efficiency compared with those prescribed for a standard piggery. The degree of reduction to be applied shall be determined according to the formula shown in section 4.6.

4.3 FIXED BUFFER ZONES (DIMENSIONS) FOR A PIGGERY

Any buffer zone whose dimensions are independent of the size of a piggery shall be defined as a fixed buffer zone.

Fixed buffer zone distances shall be the least horizontal distance between a piggery building or area designated for occupation by pigs, and each of the following features -

Public road - sealed (see Note 1)	**200 m***
Public road - unsealed (see Note 2)	**200 m***
Major water supply storage within its catchment area	**800 m**
Major watercourse and domestic water supply channel	**200 m**
Other watercourses (see Note 3)	**100 m**
Residence on the property	**100 m**
Dairy	**100 m**
Slaughterhouse	**100 m**
Property boundary (see Note 4)	**20 m**
Neighbouring piggery (see Note 5)	**3000 m**

* See also the special provision shown below.

The measuring point for a public road shall be any surface that has been specifically prepared to carry traffic and shall include associated shoulders and footpaths.

The measuring point for a watercourse shall be the highwater mark formed when the watercourse is at bank-full discharge level.

A neighbouring piggery requires a 3000 m buffer unless a legal association exists between the piggeries, or a pig health status determined by an experienced piggery veterinarian is accepted by the existing piggery's proprietors thereby providing a dispensation from the 3000 m fixed buffer.

Where a dispensation of the 3000 m distance has been obtained for a neighbouring piggery, or where the application is for an extension to an existing piggery, the buffer zones of the combined piggeries shall be determined by the responsible authority. The maximum buffer shall not exceed the prescribed buffer for a dispersed piggery incorporating all piggeries within 3000 m. The perimeter of the combined piggery shall be calculated as the dispersed piggery.

Roads - special provision

In exceptional circumstances, and at the discretion of the responsible authority these distances may be reduced by the same percentage value as determined in section 4.6 entitled "reduction in variable buffer zone dimensions (distances) for a piggery". It should be carefully noted that any subsequent failure to maintain standards which permitted a buffer zone reduction will result in non compliance with the fixed buffer zone required for a public road.

Note 1 - A sealed road for the purposes of this section shall include any public road that is sealed, in whole or in part, provides direct access to the piggery and is within 2 km of the piggery reference point (or perimeter fence if the piggery is classified as "dispersed" or "extensive").

Note 2 - This excludes unsealed roads carrying fewer than 50 vehicles a day and not subject to planned upgrading within two years by the responsible authority. Predicted increases in traffic flows generated by the proposed piggery shall not be included in the 50 vehicle a day criterion. The minimum buffer distance for such roads shall be 50 m except where it can be demonstrated that the road is effectively unused.

Note 3 - Other watercourses shall exclude those watercourses which, in the opinion of the responsible authority, are at an elevated level or protected by banks or levees such that under flood conditions effluent or piggery contaminated waters will not enter the watercourse.

Note 4 - No open effluent channel shall be within 50 m of a property boundary.

Note 5 - For the purpose of the 3000 m fixed buffer distance a neighbouring piggery is defined as a piggery, or a combination of piggeries within 3000 m of the proposed piggery, with an R value of 500 or greater. The 3000 m fixed buffer is required for new piggeries, and not for extensions to existing piggeries.

4.4 CALCULATION OF DISTANCES FOR THE VARIABLE BUFFER ZONES OF A STANDARD PIGGERY

4.41 Introduction

Except in special cases (e.g. cases involving prevailing winds, significant topography; constrained winds, "breeder-only" units), which are described in subsequent sections, the buffer zone distance between a piggery reference point and a proclaimed township boundary shall be calculated using the formula:

1 R-value unit = 1 m.

Fractions of a metre shall be used, as defined below, for other specified residential categories. **The formulae shall only be applied to piggeries having R-values in the range 2000 to 5000.**

Zone	Description	Distance (m)
1_A	Piggery reference point to a proclaimed township boundary	1.00 R
1_B	Piggery reference point to a rural residential zone or residential area	0.75 R
2	Piggery reference point to an isolated rural residence	0.25 R
3	Piggery reference point to a farmhouse (other than on the property of the piggery)	0.20 R

4.42 Piggeries having R-values in the range 4 to 500

For any piggery having an R-value below 500, the 500 R-value shall be used. The maximum piggery perimeter shall not exceed 200 m.

4.43 Piggeries having R-values in the range 501 to 2000

For any piggery having an R-value below 2000, the 2000 R-value shall be used. The maximum piggery perimeter shall not exceed 800 m.

4.44 Piggeries having R-values in excess of 5000

For any piggery having an R-value in excess of 5000, a works approval is required from the Environment Protection Authority.

4.45 Table of R-values and zones distances

The following table shows typical zone distances for R-values increasing in 500 unit steps. For an intermediate R-value in the range 2000 to 5000 the respective zone columns may be interpolated.

R-value (no. of pigs)	Zone 1_A (metres)	Zone 1_B (metres)	Zone 2 (metres)	Zone 3 (metres)
Fewer than 500	1600	1000	400	300
501 to 2000	2000	1500	500	400
2000	2000	1500	500	400
2500	2500	1875	625	500
3000	3000	2250	750	600
3500	3500	2675	875	700
4000	4000	3000	1000	800
4500	4500	3375	1125	900
5000	5000	3750	1250	1000

4.5 VARIABLE BUFFER ZONE DIMENSIONS FOR SPECIFIC CONDITIONS

Under certain meteorological or topographic conditions the buffer zones previously described will not apply (see Note 1). The buffer zones are modified when the following conditions apply -

Prevailing wind conditions - see appendix 3

Constrained wind conditions - see appendix 4

Significant topography conditions - see appendix 5

4.6 REDUCTION IN VARIABLE BUFFER ZONE DIMENSIONS (DISTANCES) FOR A PIGGERY

A reduction, not exceeding 40% of "standard" piggery distances, may be sought on the variable buffer zone distances (fixed buffer distances are unaffected). The reductions apply where higher-than-average standards on the piggery are designed **and maintained at all times.**

Note 1 - In Victoria, it is estimated that less than 5% of all existing piggeries have been established in locations where buffer zone dimensions would require modification due to these specific conditions. Although it is unlikely that many new piggeries would be promoted in such areas it is necessary, for completeness, that this Code of Practice cover all potential situations.

The responsible authority may decide not to permit a buffer zone reduction if the pig feed includes, or may include, any liquid dairy by-products (e.g. whey) and/or the cooking of animal residues (e.g. abattoir or poultry "inedible offal"/trimmings). See also the note at the end of Section 4.73.

4.61 Reduction factors

Reduction factors based on odour emissions, noise, maintained supplies and management are shown on the following page. The factors are designated A to G (see table Page 13).

4.62 Reduction formula

Percentage reduction = 100 x [1 - (A x B x C x D x E x F x G)] of standard buffer zone dimensions (see Note 2 on the following page).

The maximum reduction shall NOT EXCEED 40%.

4.61 REDUCTION FACTORS

Designator		Reduction Factor
A	**Emission to air from buildings**	
	(1) Ridge and side-ventilators (or side only)	1.00
	(2) Ridge-ventilators only	0.95
	(3) Ridge-ventilators plus trees (more than 10 m high) surrounding the piggery compound	0.90
	(4) Air-scrubbing (i.e. odour removal) of all building exhaust gases	0.20
B	**Effluent collection system within all pig buildings**	
	Faeces, urine and other biological material removed from the confines of the buildings	
	(1) Less than 6 hours	0.75
	(2) While essentially aerobic but in no case greater than 30 hours	0.90
	(3) Greater than 30 hours	1.00
C	**Effluent collection system outside all pig buildings (but within the piggery compound)**	
	(1) Closed pipes (pig buildings to aerobic holding tank/pump well)	0.95
	(2) Open channels (pig buildings to aerobic holding tank/pump well)	1.00
D	**Effluent treatment system (within the piggery compound)**	
	(1) Anaerobic lagoon(s) (including all inlet pipes/channels)	1.00
	(2) Facultative lagoon(s) (including all inlet pipes/channels)	0.95
	(3) Aerobic lagoon(s)	0.60
	(4) Aerated lagoon(s) (aerobic surface layer over entire lagoon)	0.75
	(5) Series lagoons anaerobic/aerobic (or facultative)	1.00
	(6) Other treatment systems	(see Note 1)
E	**Noise**	
	(1) Maintaining noise recommendations (see section 6.1)	0.95
	(2) For each 3dB increase above noise recommendations	0.05 per 3dB
F	**Power supplies for ventilation and effluent handling and pumping**	
	(1) Reliable power supply (loss of supply for not more than an aggregate of 2 hours a week)	1.00
	(2) Power supplies (loss of supply in excess of 2 hours a week)	1.00 plus 0.01 per hour
	(3) Standby power supplies - full-load standby capacity	0.80
	(4) Standby power supply for each 25% reduction in full load standby capacity.	0.80 plus 0.5 per 25%
G	**Management**	
	Stock under surveillance - 24 hrs/day	0.90
	12 - 12 hrs/day	0.95
	6 - 11 hrs/day	1.00
	1 - 5 hrs/day	1.10
	Less than 1 hr/day	1.20

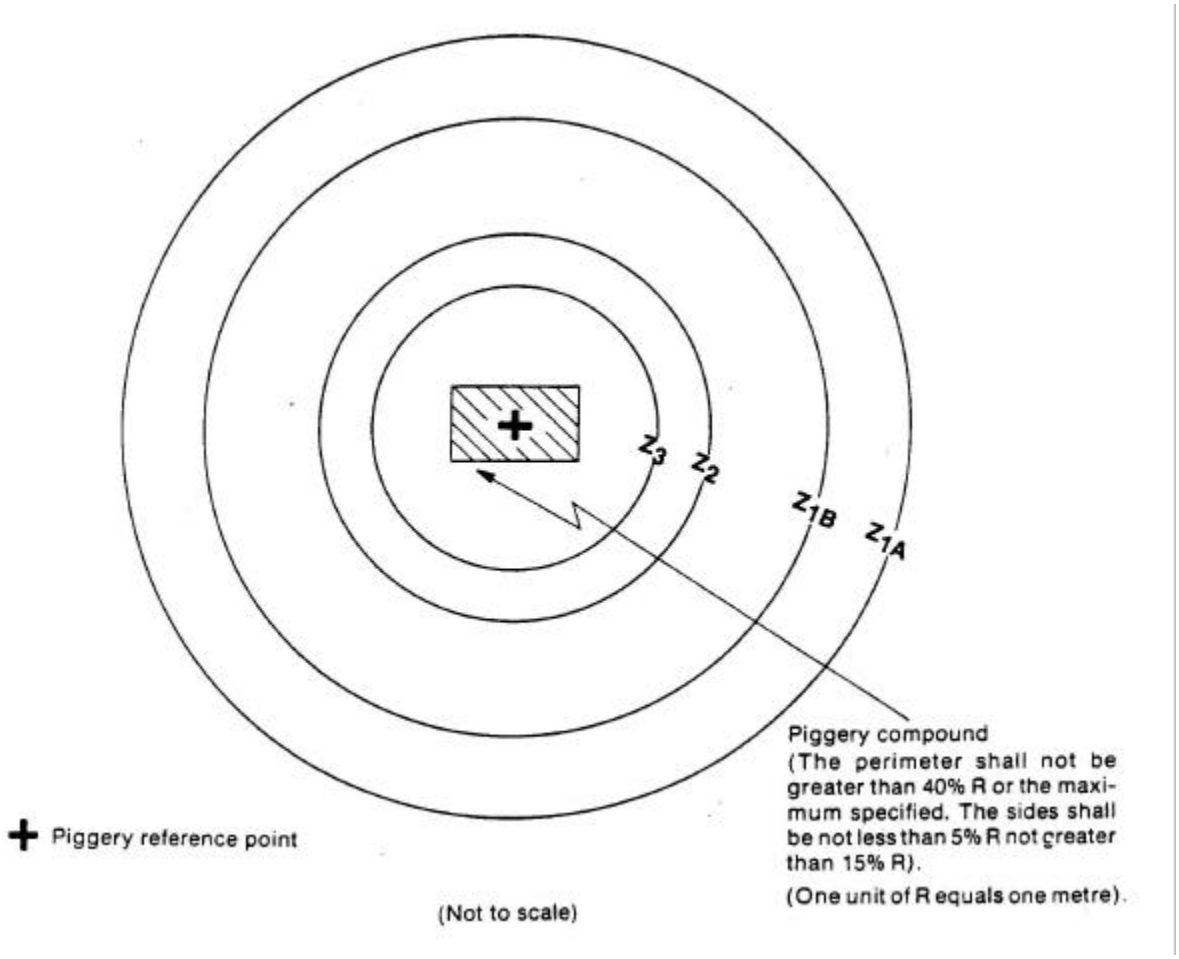
Stock under surveillance shall mean that a person, qualified or competent to have charge of stock and deal with routine or emergency conditions as they arise, is monitoring the functions of that piggery.

Note 1 - In Victoria, to be determined by the Environment Protection Authority.

Note 2 - This Code of Practice calls for a reasonably high standard at all piggeries, which is achieved by good management and control of odour-generating procedures. A piggery scoring a negative reduction factor (ie. an increase) in variable buffer zone distances would not meet the requirements of this Code of Practice.

Example 1 - BUFFER ZONES

4.63 Piggery with radial buffer



Buffer zone

Z_{1A} – Piggery reference point to a proclaimed township boundary

Z_{1B} – Piggery reference point to a rural residential zone or residential area

Z_2 -- Piggery reference point to an isolated rural residence

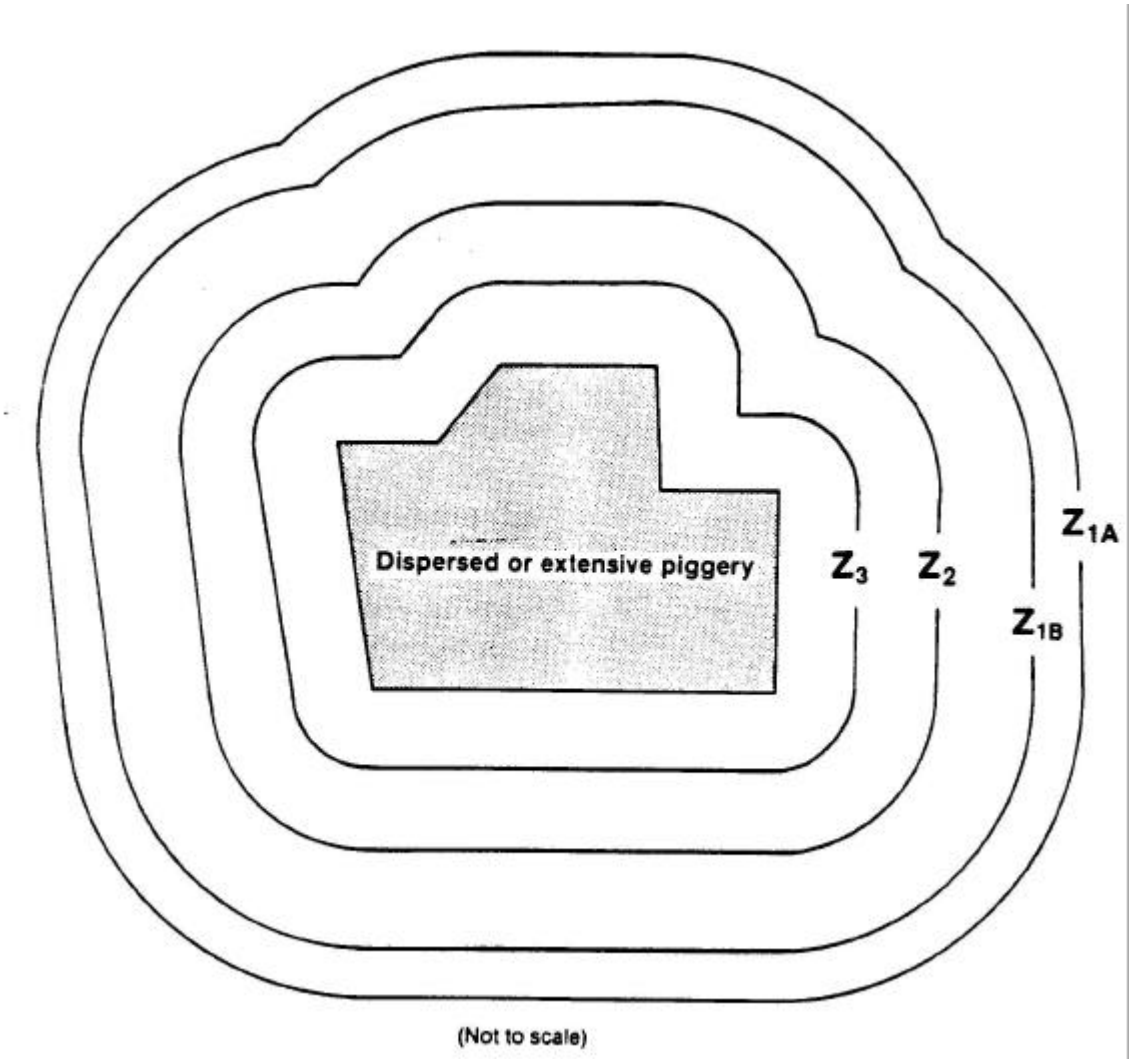
Z_3 -- Piggery reference point to a farmhouse (not on the property of the piggery)

GENERAL NOTE:

1. Under normal circumstances (i.e. those unaffected by restraining parameters such as prevailing winds) these buffer zones are radials centred on the piggery reference point.
2. Where restraining parameters exist, zones 1_A and 1_B are reclassified as zone 1.

Example 2 - BUFFER ZONES

4.64 Dispersed or extensive piggery



Buffer zone

Z_{1A} – Piggery Perimeter to a proclaimed township or boundary

Z_{1B} – Piggery perimeter to a rural residential zone or residential area

Z_2 - Piggery perimeter to an isolated rural residence

Z_3 - Piggery perimeter to a farmhouse (not on the property of the piggery)

GENERAL NOTE:

1. Buffer zone distances follow the perimeter of the piggery and shall be drawn so that distances are not less than the minimum prescribed for each buffer zone.
2. Where restraining parameters exist (e.g. prevailing winds etc.) then zones 1_A and 1_B are reclassified as zone 1.

4.7 BUFFER DISTANCES SURROUNDING EFFLUENT TREATMENT SYSTEMS OR LAND DISPOSAL AREAS

Buffer zones shall be established between all treatment units or land disposal areas and residential or other nominated features. They are in addition to buffer zones for the piggery and are determined separately.

Distances are measured from the perimeter of the unit or system of units. In the case of land disposal, distances are measured from the perimeter of the area being used (defined as the "wetted area"). The distances are of fixed value.

When effluent is to be spread or discharged, account shall be taken of actual and forecast wind conditions so as to prevent all such effluent being carried by the wind beyond the "wetted perimeter".

When any effluent material (liquids, solids or slurry) is taken across a property boundary or along public roads, it shall be in enclosed containers or pipes so as to avoid causing a nuisance.

4.71 Effluent treatment systems (categories)

Effluent handling systems shall be classified into five categories. The buffer zone distances required for each category are shown in the table on page 18.

Category 1
- Sludge drying beds
- Drying lagoons

Category 2
- Anaerobic lagoons
- Barrier ditches

Category 3
- Facultative lagoons
- Solids/liquids separators

Category 4
- Aerobic lagoons

Category 5
- Advanced-system package-treatment plant having totally enclosed or fully aerated units (see Note 1).

Any system in Category 3, 4 or 5 that is located **within the perimeter** of any piggery having a piggery reference point shall be deemed to satisfy the buffer zone requirements of this section.

Where an effluent handling system fits into more than one category the more (or most) stringent category shall apply.

Note 1 - Systems that have been approved as Category 5 are required to (at least) maintain the minimum approved specifications and standards. Any alteration or failure of a system may lead to a reclassification to another category number or increased buffer distances.

4.72 Effluent disposal to land (categories)

Category 1 - All effluents are discharged or projected to a height in excess of 2 metres above ground level.

- Liquid effluents in which water remains visible on the soil surface for periods in excess of 1 hour.
- Separated solids that remain on the soil surface for more than 24 hours (i.e. are not immediately ploughed in).

Category 2 - Mechanical spreaders (in combination with "ploughing-in" type equipment) and downward discharge nozzles. The discharged material shall not be projected to a height in excess of 2 metres above ground level.

Category 3 - Land receiving effluents that are "fresh" (i.e. those that are less than 12 hours old) and having a solids content of no more than 5%.

- Aerated effluents from which at least 75% solids have been removed.
- Any effluent with a B.O.D. value of less than 2500 mg/l.

Category 4 - Discharge by injection directly into the soil (to a depth of not greater than 0.4 metres) and at a rate not exceeding either the hydraulic or NPK limits determined for the local soil type(s).

Category 5 - Effluent from a tertiary treatment system.

- Packaged treatment units producing effluent of a tertiary quality (that meet and maintain the manufacturer's specifications). (see Note 1).

Where more than one category of disposal to land is used the more (or most) stringent category shall apply.

4.73 Table of Buffer Distances Surrounding Effluent Treatment Systems or Land Disposal Area

CATEGORY NO. (see Note 1)	DISTANCES IN METRES				
	1	2	3	4	5
Proclaimed township	2000	1500	1000	500	
Residential area	1500	1000	500	200	
Rural residential area	1000	500	400	200	
Isolated rural residence	500	500	400	200	
Neighbouring farmhouse	500	400	300	100	**
Property boundary (see Note 2)	20	20	20	20	See Below
Major water supply storage within its catchment area	800	800	800	800	
Domestic water supply channel	200	200	200	200	
Watercourse	100	100	100	100	
Public highway (carrying in excess of 50 vpd excluding traffic to the piggery)	200	200	150	50	

Distances shall be measured from the perimeter of the area used for handling or disposal of effluent.

** Distances in Column 5 are subject to determination by the responsible authorities.

Note 1 - When liquid dairy by-products (e.g. whey) or solids/liquids from the cooking of animal residues are, or may be, present in the piggery effluent the responsible authority may decide to classify the effluent treatment and/or effluent disposal system(s) as Category 1.

Note 2 - No non-mobile treatment facility shall be closer than 50 m of a property boundary.

5.0 DESIGN REQUIREMENTS FOR BUILDINGS

5.1 GENERAL

Any structure erected to provide shelter for pigs housed in extensive or semi-extensive piggeries shall, at the time of construction, be of materials having a service life of at least 5 years unless otherwise approved by the responsible authority.

Intensive and semi-intensive piggeries shall, at the time of construction, be constructed of materials having an expected service life of at least 10 years. This shall apply to all materials used for foundations, external walls, roofs, columns, beams and trusses. Roofs shall be weatherproof and may be insulated.

Flooring and other structures shall be designed to permit the efficient removal of all faeces and urine. Removal may be on either a continuous or intermittent basis.

5.2 INTENSIVE AND SEMI-INTENSIVE PIGGERY UNITS

Exterior and structural walls, which are in contact with pigs, shall be constructed of pig proof material and extend to a height of at least 1000 mm above floor level. The wall and drainage system will be constructed so as to avoid the discharge of pig wastes or pig waste contaminated waters to adjacent areas.

All cavity walls shall be constructed in such a manner as to deter the harbouring of vermin and birds.

Floors (including manure channels when provided) shall have an upper surface datum that is not less than 500 mm above the regional watertable.

All floors shall be of a sound and impervious material and be damp-proof.

5.3 EXTENSIVE AND SEMI-EXTENSIVE PIGGERY UNITS

All structures will be designed to minimise the likelihood of harbouring vermin and birds.

5.4 DRAINAGE SURROUNDING A PIGGERY

Where the topography surrounding the piggery causes surface water to drain towards any building within the piggery unit an interceptor channel may be provided to accept all stormwater. Stormwater thus collected shall either -

(a) be discharged by the most suitable means, either to storage, or direct to land, according to piggery unit design, or

(b) be considered as part of the piggery effluent and all effluent design systems shall incorporate the estimated peak surface water run-off.

Clean stormwater may be discharged direct from the property.

Contaminated stormwater from roofs, open yards and natural drainage shall be considered as forming a part of the piggery effluent and the effluent system shall be designed to meet peak flow conditions.

5.5 ENVIRONMENTAL CONTROL AND WORKING CONDITIONS IN ENCLOSED SPACES

Ventilation shall be provided at all times to prevent a build-up of noxious odours and toxic gases. Prescribed levels (see Note 1) for dust, noxious and toxic gases shall not be exceeded.

Headroom in all areas of buildings and other structures where stockmen are regularly required to work, and in all passageways, shall not be less than 2030 mm (see Note 2). This shall apply to all overhead projections such as conduits, lighting sources, pipes and sprinkler systems. Distances shall be measured vertically from the floor surface.

Note 1 - Statutory Rules 1975 No. 133 Harmful Gases, Vapours, Fumes, Mists, Smokes and Dusts (Amendment) Regulations Government of Victoria.

Note 2 - In Victoria reference should be made to the current requirements under the Victoria Building Regulations. These standards shall be used and not those specified by the Standards Association of Australia.

6.0 OPERATING REQUIREMENTS

6.1 NOISE

6.11 Hearing conservation

Noise levels for those working within the piggery unit are mandatory limits. These are as follows -

Where an employee is engaged in any process or occupation and either -

(i) the daily noise dose of the employee exceeds 1.0; or

(ii) the employee is at any time exposed to a noise level exceeding **115dB (A) Slow**; then

the employer shall take action to ensure that the exposure of any employee does not exceed the limits shown in (i) and/or (ii). The methods used to reduce noise shall be in accordance with those laid down by Statutory Rules (see Note 1).

All persons hearing protectors shall comply with Australian Standard AS1270.

6.12 Other limits

The noise limits for a residence (other than a residence on the property) are mandatory and are specified for quiet rural areas. Where the piggery is located in areas with higher background noise levels, higher limits may apply as specified by State Environment Protection Policy (Control of Noise from Industry, Commerce and Trade) No. N-1. Compliance with the noise limits shall be assessed at a point within 10 metres of the external walls of a residential building.

The limits applying to the property boundary shall be mandatory **only** when a reduction in buffer zone distances is sought by the proprietor of a piggery.

Noise Limits

			Residence	Property Boundary
*	Day	(0700 - 1800 hrs)	45 dB(A)	50 dB(A)
	Evening	(1800 - 2200 hrs)	37 dB(A)	45 dB(A)
	Night	(2200 - 0700 hrs)	32 dB(A)	40 dB(A)

* On Sundays and public holidays between 0700 - 1800 hrs and Saturdays between 1300 and 1800 hours the evening noise limits shall apply.

Note 1 - In Victoria see Statutory Rules (1978) No. 269 Health (Hearing Conservation) Regulations 1978.

6.2 GENERAL SAFETY

6.21 Entry into confined spaces

No person shall enter an enclosed space used as a pit or manure storage area unless equipped with a respirator and wearing a safety line. A "safety observer" shall also be in attendance but remain outside the possible danger area. All enclosed pits shall display prominent warning signs as follows -

DANGER - GAS

NO SMOKING - NO NAKED FLAME

6.3 FLIES AND FLY-BREEDING

All reasonable steps shall be taken to minimise fly-breeding.

6.4 STORAGE AND DISPOSAL OF CONTAINERS AND TOXIC SUBSTANCES

Care shall be exercised in the storage and disposal of containers of such materials to prevent any toxic substance entering any watercourse, either directly or by run-off from land (see Note 1).

6.5 FEED AND FEED-STORAGE

Feed shall not be left on floors, troughs, bowls, ground or general feeding areas in such a way that it becomes offensive. Feed and feed storage areas shall not encourage the breeding of vermin.

Swill-feeding shall not be permitted (see Notes 2 and 3).

Animal offal shall be boiled for at least one hour before being fed to pigs. All inedible matter shall be removed within 24 hours and either incinerated, removed from the premises by a proper disposal operator, or buried.

Note 1 - In Victoria, reference should be made to the "Guidelines for Storage and Disposal of unwanted Agricultural Chemicals and Chemical Containers" published by the Environment Protection Authority and the Department of Agriculture and Rural Affairs.

Note 2 - Swill means "food refuse" and includes

(a) the meat, fat, bones, blood, eggs or viscera of any stock; and

(b) any other matter, product or substance which contains or has been in contact with any such meat, fat, bones, blood, eggs or viscera.

Note 3 - Certain exemptions to the prohibition of food refuse fed to pigs are contained in Stock Diseases Act, 1968 (No. 7724) Section 15, Government of Victoria.

When wrapped food, condemned for human consumption, is fed to pigs all non-biodegradable wrapping material shall be removed either before feeding or within 24 hours of consumption. All such wrapping material shall be disposed of by incineration, burial or removal so that it will be neither offensive visually nor a hazard to wildlife.

All materials used in the construction of containers for feed or water (including bins, chutes and pipes) shall be free of sharp edges or projections that could cause injury to personnel or animals. (Any such materials that may become accessible to pigs shall be "pig proof").

6.6 DISPOSAL OF DEAD PIGS AND OTHER BIOLOGICAL MATERIAL

Dead pigs, immediately upon discovery, shall be removed from the proximity of other pigs. Where it is impracticable to dispose of the carcases immediately they shall be temporarily held in an area inaccessible to animals, vermin and birds. Disposal in an approved manner shall be carried out within 24 hours of death.

Biological material (e.g. afterbirths) shall also be destroyed or removed and held in an area inaccessible to animals, vermin and birds until destroyed.

Acceptable disposal methods (in order of preference), shall be -

(a) Removal to a disposal/rendering works

(b) Incineration

(c) Burial

Incineration shall conform to local fire regulations and restrictions.

When burial methods are used the excavated trench or pit shall not be deeper than 2000 mm or 500 mm above the watertable, whichever is the lesser value.

Carcases and other biological matter, when placed in the burial trench, shall be immediately covered with 500 mm of soil. A minimal final cover for all trenches and pits shall be 500 mm of compacted topsoil.

6.7 INSTALLATION OF EQUIPMENT

All equipment, mechanical and/or electrical shall be installed, commissioned and operated in accordance with current safety regulations.

6.8 OPERATION AND MAINTENANCE OF EQUIPMENT

Effluent handling equipment will be maintained in effective working order.

6.9 INCINERATION

Incinerators shall, if required, conform to air-quality standards and regulations (see Note 1).

Note 1. In Victoria, the Environment Protection Authority issues Air Discharge Licences.

6.10 LAGOONS

Lagoons shall be constructed with a low permeability liner of adequate thickness and operated within a minimum freeboard of 500 mm and maintained to ensure wastes do not contaminate surface or ground waters.

Fences shall be provided to prevent easy access by farm stock and humans.

All lagoons having a depth of 2 metres or more shall have prominent warning notices placed around the perimeter fence, reading -

DANGER - DEEP WATER

All ramps to lagoons or pits shall be designed to support the attendant service vehicles without damaging the structure of the lagoon.

7.0 DISPOSAL OF EFFLUENT

7.1 DISPOSAL TO LAND

Effluent disposal to land (with or without pre-treatment) shall be in accordance with the following -

1. There shall be no run-off of wastes or of stormwater contaminated by wastes from the property. Stormwater uncontaminated by wastes may be discharged off-site.

   Precautions shall be taken during periods of bad weather to prevent any irrigated effluent being carried downslope towards residences, watercourses, and prohibited flood plain areas.

2. No polluting material shall be permitted to enter any groundwater (including bore holes, mineshafts, wells or infiltration basins or other similar structure specifically designed for direct injection to groundwaters) which is detrimental to the beneficial use of ground waters or surface waters.

3. The hydraulic loading of each and every soil type shall not be exceeded.

4. The NPK loading on any soil shall not be exceeded (see Note 1), or such values that are normally accepted as being used by the designated vegetative cover.

7.2 SOIL-TESTING (INTRODUCTION)

Soil-testing, if required, determines:

(1) the permitted hydraulic loading, such that all the waste water applied to the land will be taken up by the soil moisture deficit and/or evaporated through evapotranspiration.

(2) that all the applied nutrients will be taken up by the soil deficiency (if any) and the type, or proposed type, of vegetative cover. The responsible authority will normally accept the standard NPK loading as shown in Note 1 below, or such values that are normally accepted as being required by the designated vegetative cover.

Reference shall be made to the responsible authority(ies) to determine whether specific local conditions apply to the hydraulic and/or nutrient loadings proposed.

7.3 SOIL-TESTING FOR HYDRAULIC LOADING

Soil-testing shall **only** be required when the actual disposal area available (i.e. area remaining after all buffer zones, areas for building, lagoons and unusable ground has been excluded) is less than 1 hectare per 35 pigs.

Note 1 The suggested maximum NPK loadings are:-

N - 350 kg/ha/yr

P - 150 kg/ha/yr

K - 200 kg/ha/yr

The number of test sites selected within the disposal area shall be sufficiently representative of each of the characteristic soil types identified.

Unless specified to the contrary (see Note 1), in writing, by the responsible authority the tests shall be as follows -

(a) Effluent application **onto** the soil surface - Double-ring infiltrometer.

(b) Effluent application **into** the soil (direct injection) - Percolation test.

These tests shall be carried out according to the specifications shown in Appendix 1 and Appendix 2.

Acceptable figures for both tests shall be in the range 5 mm/hr to 150 mm/hr. When the rate exceeds 150 mm/hr the responsible authority shall require further investigations to be made to determine the capability of the soil to retain NPK from the effluent.

7.4 DISPOSAL OF BOULDER-STREWN LAND

A boulder shall be defined as any rock or stone having dimensions in excess of 500 mm when measured along its longest axis and 400 mm on an axis perpendicular to that axis.

A significant incidence of boulders shall be defined as any land containing, on its surface, boulder coverage in excess of 20%.

When boulder-strewn conditions apply the land area required for disposal of effluent shall be increased in direct proportion to the actual area covered by boulders.

Disposal to boulder-strewn land shall not be permitted when the area covered by boulders exceeds 80% of the total area.

7.5 DISPOSAL OF EFFLUENT VIA A BOREH0LE

No effluent that contains, or may contain water contaminated by pigs or pig effluent (e.g. contaminated stormwater), shall be disposed of below ground level through a borehole.

7.6 COMBINATION OF EFFLUENT WITH OTHER WATERS

7.61 Sullage

Sullage (waste water from kitchens, showers and washing facilities but not sewage) may be mixed with piggery effluent before treatment or disposal.

Note 1 - Soil testing could include other approved tests, e.g. Talsma test.

7.62 Sewage

No sewage shall be added to piggery effluent except where both are immediately discharged to a public sewer and there is no possibility of access to sewage or sewage mixture by man or animal.

7.63 Water derived from irrigation channels or watercourses (including boreholes)

A hydraulic disconnector device shall be installed to prevent at all times the backflow of effluent that may arise should a malfunction of equipment or abnormal conditions occur.

APPENDIX 1

DOUBLE RING INFILTROMETER TEST

Equipment	Dia. (mm)	Length (mm)	Thickness (mm)	Finish
Measuring cylinder	300	300-500	2*	Smooth
Buffer cylinder	500	200	-	-
Driving plate	400	-	12	**

* A greater thickness may be used if a ground cutting-edge is provided.

** Lugs on the underside, to centre the driving plate onto the measuring cylinder.

Tamping Hammer - Suitable for driving the measuring cylinder. Recommended weight 10 kg.

Water Supply - Sufficient for the full test procedure.

Measuring Device - Hook Gauge or manometer or automatic flow/stage recorder.

Method

(i) Select a site which is representative of the general soil in the area of the test.

(ii) Press the measuring cylinder into the soil using the driving plate and hammer, as required, to drive the cylinder **vertically** into the soil to a depth of approximately 100 mm. (Note: irregular driving (side to side penetration) will lead to poor bonding between the cylinder wall and the soil).

(iii) Press the buffer cylinder into the soil to a depth of 50 to 100 mm and approximately concentric with the measuring cylinder.

(iv) Fill the buffer cylinder to approximately 50 mm depth and maintain at least 25 mm throughout the test.

(v) Protect the surface of the soil at the bottom of the measuring cylinder with a piece of cloth, then fill the cylinder with water to a depth of approximately 75 mm.

(vi) Having removed the soil protecting cloth, make a measurement of the water surface elevation using a hook gauge (or manometer or automatic flow/stage recorder). Record the elevation and note the time.

(vii) Make additional hook gauge measurements at intervals (typically at 1, 3, 5, 10, 20, 30, 45, 60, 90, 120 minutes and hourly thereafter). The intervals shall be such that the water level does not fall more than 25 mm between successive measurements. Continue until the rate of intake to the soil is almost constant.

(viii) When the water level in the measuring cylinder has dropped by 25 to 50 mm add sufficient water to return the water surface to (approximately) its initial elevation. Record the elevation just before, and again just after filling. This time interval should be as short as practicable. (The assumption made in the theory is that the refilling is instantaneous. Alternatively a constant head device incorporating a flow measuring device or automatic flow stage recorder may be substituted.

APPENDIX 2

PERCOLATION TEST

The site for the proposed disposal area shall be tested in accordance with the percolation test shown below.

Sufficient test holes shall be established to effectively represent the soil conditions over the site.

Where two **percolation tests** on the same hole differ by more than 20% **the test** shall be repeated until consistency of results is obtained.

After the percolation rate of all test holes has been computed any test results that differ by more than three standard deviations from the remainder shall be discarded. The arithmetic mean of the acceptable test results shall be used as the percolation rate for the disposal area.

Where there are significant changes in soil types over the proposed disposal area, the percolation rate for each sub-area shall be determined separately.

The soil percolation test requires that a hole shall be augered vertically into the soil at the test site and prepared in a specified manner. After thorough wetting, the hole shall be filled with water to a prescribed depth and the rate at which the water falls (determined by measuring the fall over a given period of time) shall provide an indication of the soil hydraulic conductivity.

In some soils (notably sandy soils) collapse of the sides of the hole shall be prevented by augering an oversize hole and inserting a perforated liner tube.

The following apparatus will be required -

(a) Soil auger, hand operated (i) 100 mm dia. (cohesive soils)
(ii) 150 mm dia. (sandy soils) and

(b) Perforated liner tube 100 mm outside diameter (if required) and

(c) Coarse sand or fine gravel and

(d) Float-gauge or tape measure and

(e) Watch and

(f) Reference marker and

(g) Water container of known capacity or a constant head device.

Preparation of holes for cohesive soils (no liner required)

1. a 100 mm dia. auger is used. The hole is prepared by digging carefully to the subsoil (or 300 mm) but not exceeding 500 mm. Where shallow soil (less than 300 mm) extends over a rocky base, the hole shall be prepared to rock level. Holes shall be vertical.

Care shall be taken to avoid the use of augers that may compact or smear the soil surface with oils or greases.

2. The bottom and sides of the hole shall be scraped carefully, with a hand-rake or coarse wire brush to provide as natural a soil interface as possible. All loose material shall be removed from the bottom of the hole.

GENERAL NOTE - Cohesive soils **may** also be tested using a liner as specified for sandy soils.

3. Course sand or fine gravel shall be added to a depth of 50 mm in the base of the hole to prevent sealing of the bottom by scouring or sediment.

Preparation of holes for sandy soils (liner required)

1. A 150 mm dia. auger is used. The hole is prepared by digging carefully to the subsoil (or 300 mm) but not exceeding 500 mm. Where shallow soil cover (less than 300 mm) extends over a rocky base, the hole shall be prepared to rock level. Holes shall be vertical.

Care shall be taken to avoid the use of augers that may compact or smear the soil interface.

2. The bottom and sides of the hole shall be scraped carefully with a hand-rake or coarse wire brush to provide as natural a soil interface as possible. All loose material shall be removed from the bottom of the hole.

3. The perforated liner shall be inserted vertically into the hole, and the gravel or other supporting material shall be placed carefully between the outside of the line and the hole wall.

4. Coarse sand or fine gravel shall be added to a depth of 50 mm in the base of the hole to prevent sealing of the bottom by scouring or sediment.

Percolation test

1. The hole shall be pre-soaked to ensure saturation and swelling of the soil. This requires that the hole shall be filled with clean water to a minimum depth of 150 mm for at least one hour. For clay soils, soaking shall take place for a minimum of 24 hours, and the hole shall be topped up as necessary. For sandy soils containing little or no clay the swelling procedure is not essential. Topping up is most easily achieved if a constant head device is available.

2. The water level shall be adjusted to 150 mm.

3. The drop in water level shall be measured for two 30 minute periods. Water shall be added at the end of each test as required to maintain a depth of 150 mm. Where the water seeps away rapidly, as in sandy soils, the test may be carried out over a reduced period of 10 minutes.

Repeatability of percolation tests

Percolation tests provide a simple and reasonably effective means of obtaining an indication of the percolation rate of soil. The five major sources of error (compaction of wall sides, measurements, collapse of the test hole, depth of water added to the hole, and the hole diameter) can be considerably reduced by the use of a perforated liner tube and a constant head device. The fall rate is then measured by the water level in the device.

Calculation of percolation rate

The percolation rate is calculated by taking the lower rate of fall of the two results to determine the rate in millimetres per hour.

APPENDIX 3

DETERMINATION OF BUFFER ZONE DISTANCES WHEN PREVAILING WIND CONDITIONS APPLY

(1) Piggeries classified as having a piggery reference point

Zones 1, 2 and 3 shall be determined with reference to the diagram on the following page as follows -

(a) The upwind section of each zone shall be arcs of circles of radii Y_1, Y_2, Y_3 centred on the piggery reference point. The values of Y_1, Y_2, Y_3 shall be determined from the accompanying table according to the size of the piggery.

(b) The downwind section of each zone shall be arcs of the circles of radii Z_1, Z_2, Z_3 centred on points P_1, P_2, P_3. These points shall be located on a line orientated in the direction of the prevailing wind and passing through the piggery reference point. The points P_1, P_2, P_3 shall be spaced distances of D_1, D_2, D_3 respectively from the piggery reference point and the values shall be determined from the accompanying table according to the size of the piggery.

(c) Straight lines shall join each arc that defines a particular zone. These lines shall form a tangent to each arc.

Buffer Zone	Description
Zone 1	Isolation distance to a proclaimed township boundary or rural residential area zone or residential areas.
Zone 2	Isolation distance to an isolated rural residence.
Zone 3	Isolation distance to a farmhouse (not on the property of the piggery).

Zone 1 is associated with distances Y_1, D_1, Z_1

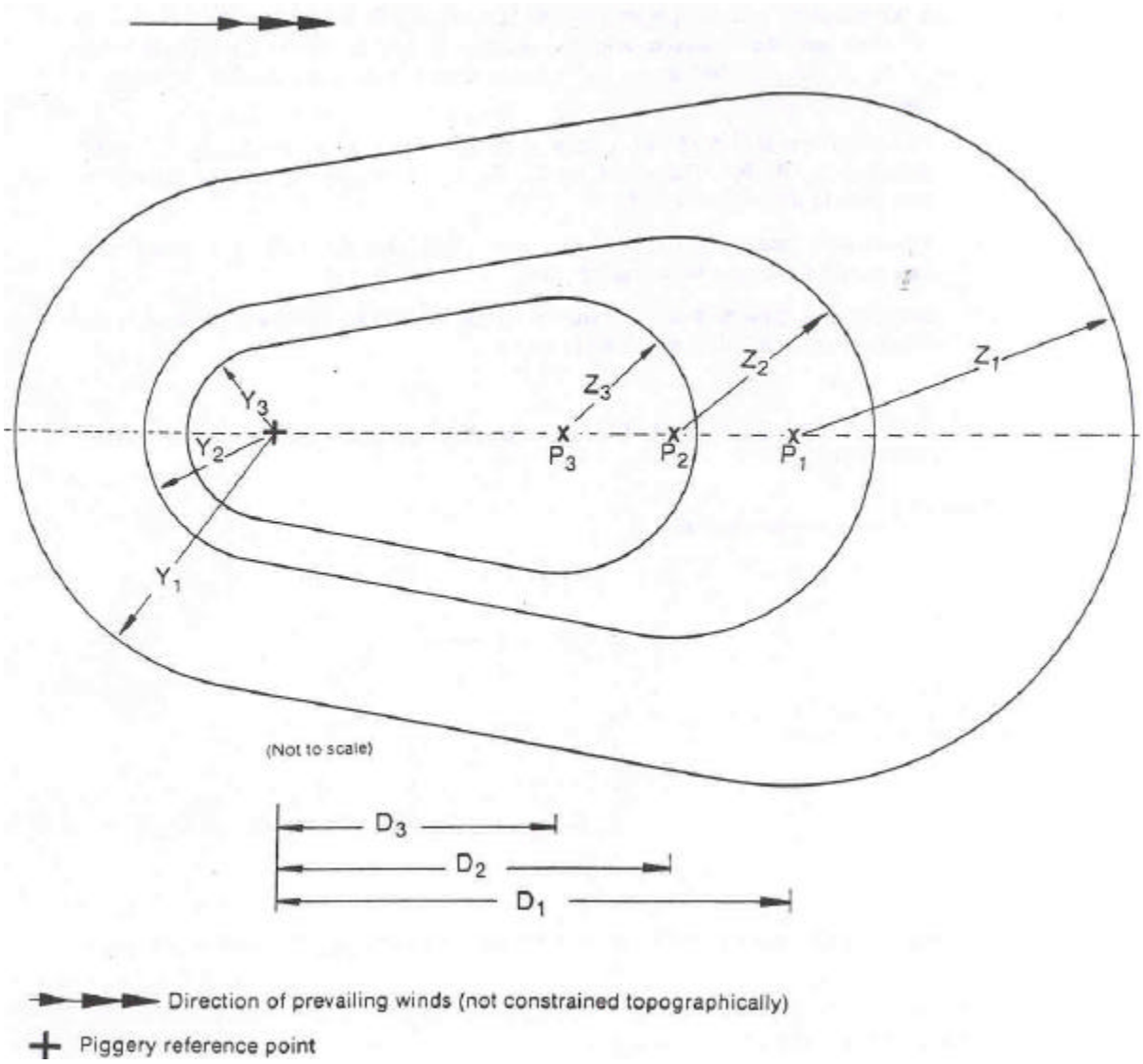
Zone 2 is associated with distances Y_2, D_2, Z_2

Zone 3 is associated with distances Y_3, D_3, Z_3

R-VALUE	Y_1 (m)	Y_2 (m)	Y_3 (m)	D_1 (m)	D_2 (m)	D_3 (m)	Z_1 (m)	Z_2 (m)	Z_3 (m)
Less than 2000	Use 2000 R-value			500	400	300	Use 2000 R-value		
2000	2000	500	400	1000	500	400	2000	500	400
3000	2500	650	500	1500	650	500	3000	750	600
4000	3000	750	600	2000	750	600	4000	1000	800
5000	3500	900	700	2500	900	700	5000	1250	1000

Example:

BUFFER ZONE DISTANCES WHEN PREVAILING WIND CONDITIONS APPLY (PIGGERY HAVING A PIGGERY REFERENCE POINT)



Distances Y_1 Y_2 Y_3: are radial and centred on the piggery reference point. (For a dispersed piggery unit these zones follow the perimeter of the piggery area and have the same respective values Y_1 Y_2 Y_3).

Distances Z_1 Z_2 Z_3: are down-wind of the piggery unit and are centred on points the distances of which are D_1 D_2 D_3 respectively from the piggery reference point.

(2) **Piggeries classified as dispersed or extensive**

Zones 1, 2 and 3 shall be determined as follows -

(a) A line shall be determined so that it is parallel to the direction of the prevailing wind. This line shall bisect the area defining the dispersed or extensive piggery.

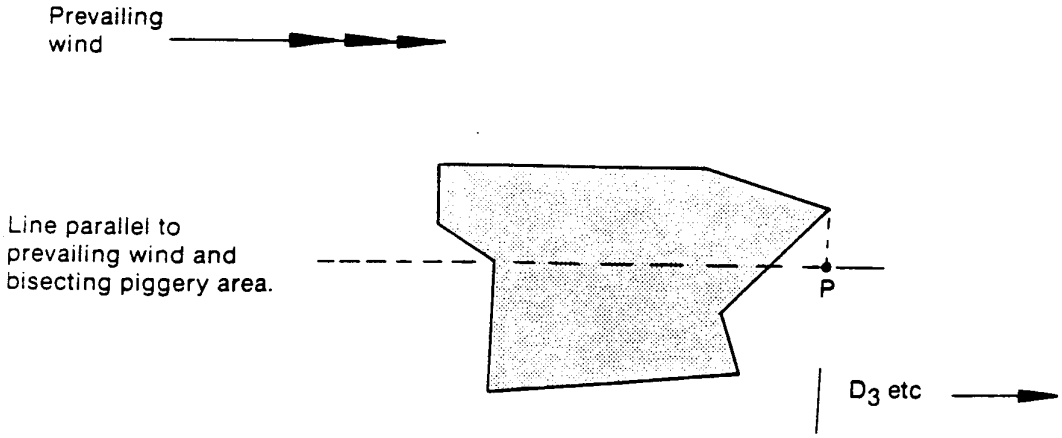
(b) The extreme downwind boundary or point of the piggery area shall be determined and a perpendicular projection made onto the line defining the prevailing wind. This point "P" shall form the measuring point for distances D_1, D_2, D_3 which in turn locate points P_1, P_2, P_3, as described in the last section headed "Piggeries classified as having a piggery reference point".

(c) The downwind section of each zone shall be arcs of circles of radii Z_1, Z_2, Z_3 centred on points P_1, P_2, P_3. The values for D_1, D_2, D_3 and Z_1, Z_2, Z_3 shall be determined according to the preceding table.

(d) The upwind section of each isolation zone shall have the value that would have applied had there been no prevailing wind.

(e) Straight lines, tangential at the points of contact, shall join the downwind arcs to the respective upwind buffer zone boundaries.

Example: BUFFER ZONES FOR A DISPERSED PIGGERY IN PREVAILING WIND CONDITIONS.



The line parallel to the direction of the prevailing wind shall divide the piggery area into two equal parts.

A perpendicular shall be dropped from the extreme downwind point of the piggery area to the described line to define a point P.

Distances D_1 D_2 D_3 shall be measured from point P to determine the centres for the radials Z_1 Z_2 Z_3.

GENERAL NOTE - When such a piggery is located in a valley having constrained winds (see Appendix 4) the extreme points in each of the two wind directions (defined as P and P_1) shall be determined and distances D_1 D_2 D_3 measured from these two points to determine the respective centres of the zones Z_1 Z_2 Z_3.

APPENDIX 4

DETERMINATION OF BUFFER ZONE DIMENSIONS WHEN CONSTRAINED WIND CONDITIONS APPLY

(A constrained wind has a speed of 6 knots or more and is forced to blow in a confined path because of the presence of topographical features, e.g. a narrow valley).

The wind must blow in one direction (i.e. "up-valley" or "down-valley") for either -

(i) 30 consecutive days in any one year; or

(ii) an aggregate of 100 days in any one year.

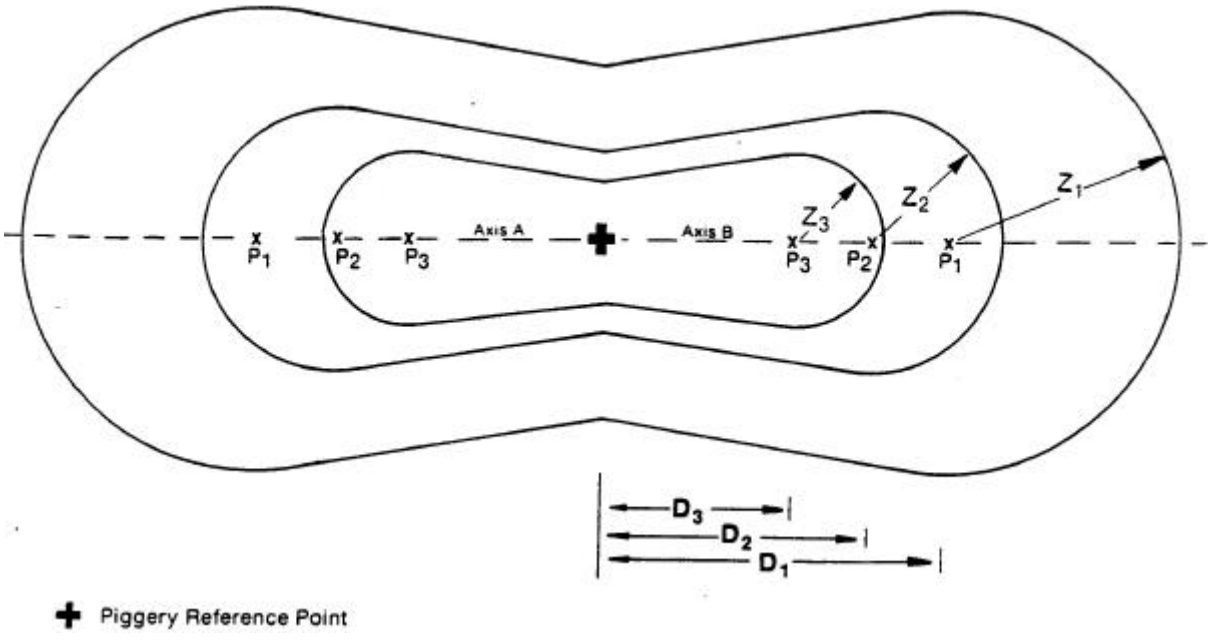
The Buffer zone dimensions shall be determined as follows -

(a) Axes shall be established that follow the general directions of the valley and pass through the piggery reference point, or, in the case of dispersed piggery, the extreme points "P" and "P_1" (as defined in the previous section), for both the "up-valley" and "down-valley" sides of the piggery.

(b) The dimensions and profile of the buffer zones shall be determined in the same manner as that for prevailing wind conditions (see previous sections). The profile shall be "mirrored" about a line that is perpendicular to the topography axis (or axes) and **also** passes through the piggery reference point (or points "P" and "P_1" as appropriate). The "up-valley" and "down-valley" buffer profiles shall be similar in shape.

(c) Care shall be exercised to ensure that the minimum isolation distances are maintained.

Example: BUFFER ZONE DIMENSIONS WHEN CONSTRAINED WIND CONDITIONS APPLY.



The Axes A and B: These shall follow the general direction of the valley.

It should be noted that these two axes need not necessarily be collinear but may be inclined to each other if this provides a better "fit" to the general topography of the valley.

GENERAL NOTE - The minimum Y_1 Y_2 Y_3 values shall be maintained.

APPENDIX 5

DETERMINATION OF BUFFER ZONE DIMENSIONS WHEN SIGNIFICANT TOPOGRAPHY CONDITIONS APPLY

When a piggery is to be located in the vicinity of significant topography (i.e. where surrounding hill(s) exceed 250 m above the piggery height datum and the 250 m contour is within 3 km of the piggery) the following shall apply -

Case 1 - Piggery surrounded by significant topography on two or more sides.

Case 2 - Piggery having significant topography on one side only.

Case 1

The appropriate R-value buffer zone shall apply, as shown in section 4.45 or in Appendix 3, (i.e. the standard buffer zone or the prevailing winds buffer zone). Where a zone boundary intersects the significant topography contour line the zone boundary radial shall be truncated at that point and the zone boundary shall then follow the contour line until further intersection(s) with the zone boundary radial are made. An example is given on page 37.

Case 2

(i) If the piggery lies closer than 3 km to the significant topography contour of an isolated hill the following shall apply:

For each 1 km reduction in the distance between the piggery and the significant contour line, the Z_1 zone distance shall be increased by 500 m up to a maximum of 6500 m and zones Z_2 and Z_3 distances proportionately increased. These values are shown in the table on the following page.

When significant topography contour is in excess of 3 km from the piggery no adjustment of the appropriate zone boundary patterns is required. When a zone boundary radial intersects the significant topography line the radial shall be truncated at that point and the zone boundary shall then follow the contour line until further intersections with the zone boundary radial are made.

(ii) Piggery in the vicinity of an isolated hill:

The provisions made for Case 2 (i) shall apply but where the hill is limited in extent the zone boundaries following beyond the significant topography contours shall be determined at the cut off lines drawn from a specified point to extreme points on the significant topography contour.

The specified point(s) shall be -

(a) Piggery reference point or

(b) Extremities of the dispersed piggery. Such points shall be selected to give the LARGEST zonal area.

Examples of case 2 (i) and (ii) are given on page 38.

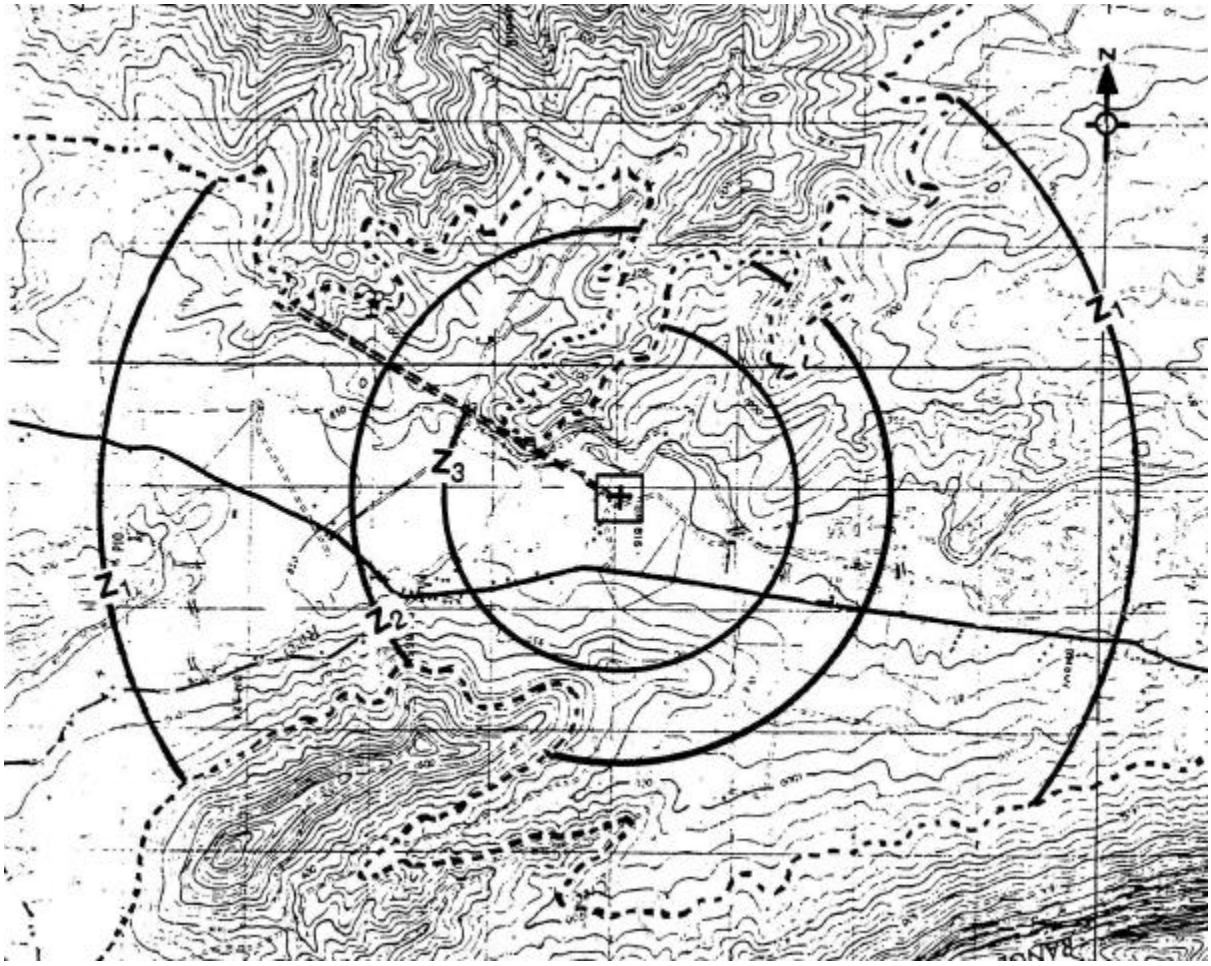
a **TABLE: SPECIAL BUFFER ZONE DISTANCES FOR A PIGGERY IN THE VICINITY OF AN ISOLATED HILL**

Distance to Significant Topography	3 km			2 km			1 km			0 km*		
R-VALUE	Z_1	Z_2	Z_3	Z_1	Z_2	Z_3	Z_1	Z_2	Z_3	Z_1	Z_2	Z_3
	(metres)			(metres)			(metres)			(metres)		
Less than 2000	2000	500	400	2000	500	400	2500	625	500	3000	750	600
2000	2000	500	400	2000	500	400	2500	625	500	3000	750	600
3000	3000	750	600	3500	875	700	4000	1000	800	4500	1125	900
4000	4000	1000	800	4500	1125	900	5000	1250	1000	5500	1375	1100
5000	5000	1250	1000	5500	1375	1100	6000	1500	1200	6500	1625	1300

* Included for interpolation purposes only.

A linear interpolation between successive pairs of values may be made.

Example: BUFFER ZONES FOR PIGGERIES SURROUNDED BY SIGNIFICANT TOPOGRAPHY ON TWO OR MORE SIDES



(Diagrammatic and not to scale)

Significant topography contour (250 metres above piggery datum)

Zone boundaries are (in this example) radial from the piggery reference point (shown **+)**

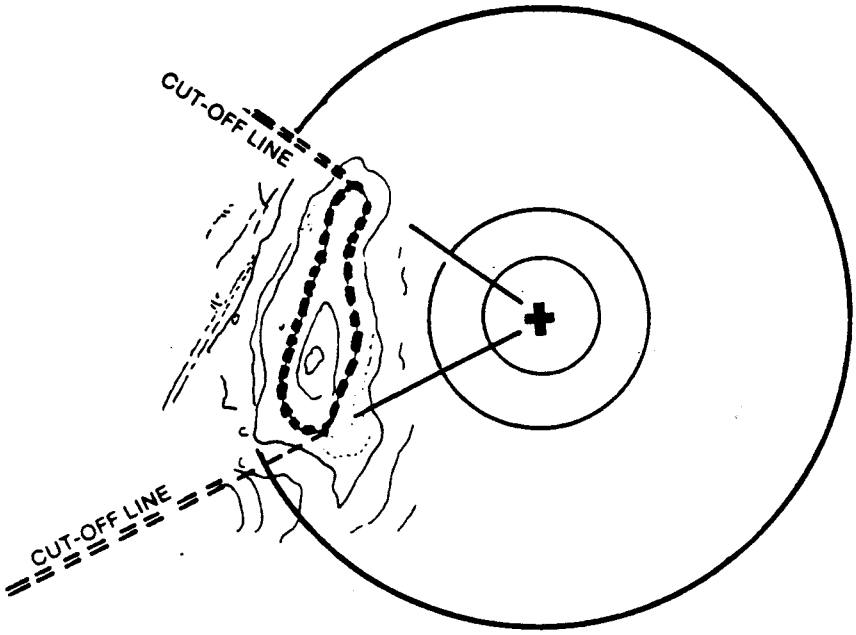
Zones are truncated at the significant topography contour.

GENERAL NOTE: This example also shows the effect of significant topography acting as an acceptable screen on the spur of land to the north-west of the piggery.

The zone boundaries Z_2 and Z_3 are further truncated on the radial line (shown = = =) centered on the piggery reference point and tangential to the spur of land.

(If the piggery has been dispersed or extensive the buffer zones would not be circles but follow the perimeter of the pig area and the line (shown - - -) would then be drawn from the extreme point of the area that gave the GREATEST zonal area)

Example: **PIGGERY (HAVING A PIGGERY REFERENCE POINT) IN THE VICINITY OF AN ISOLATED HILL**



Example: **DISPERSED PIGGERY IN THE VICINITY OF AN ISOLATED HILL**