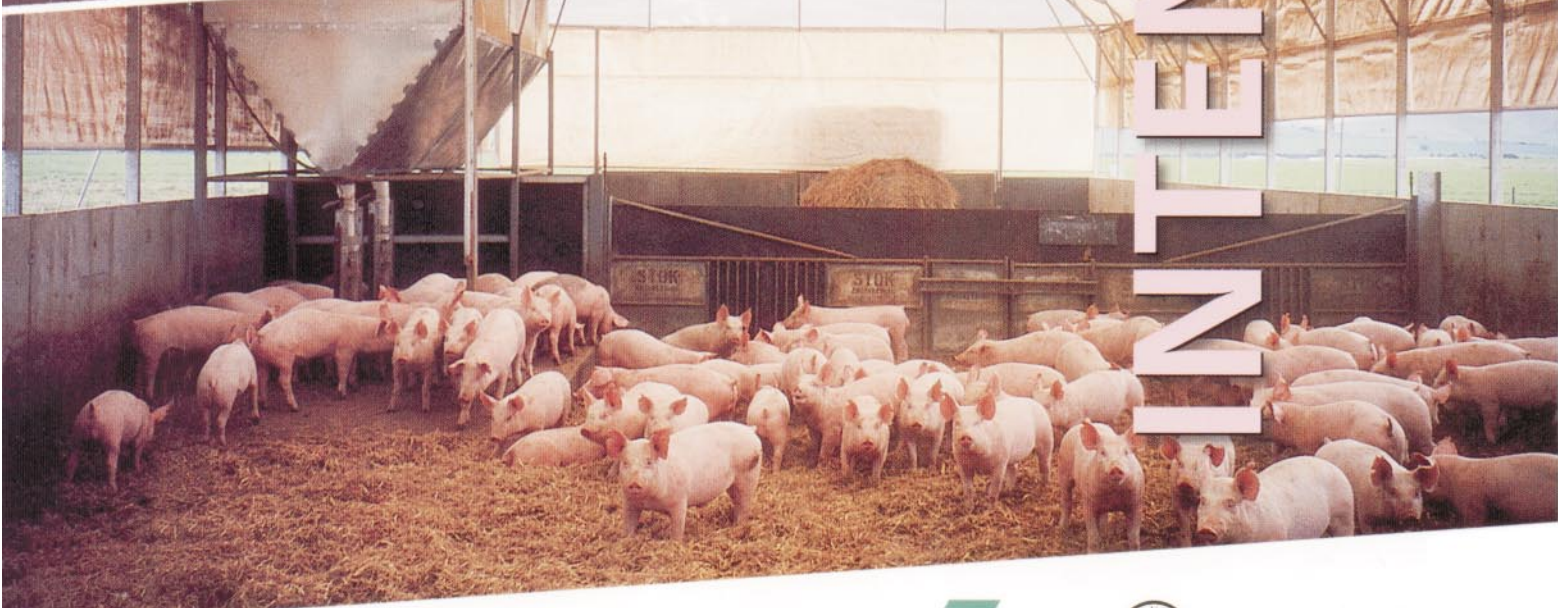


# Guidelines for establishment of

# INTENSIVE PIGGERIES IN SOUTH AUSTRALIA



GUIDELINES FOR  
ESTABLISHMENT OF  
INTENSIVE PIGGERIES  
IN SOUTH AUSTRALIA

MARCH 1998

**These Guidelines have been prepared by a Working Group representing;**

- **The Department for Primary Industries and Resources,**
- **The Environment Protection Authority,**
- **South Australian Farmers' Federation,**
- **Murraylands Regional Development Board,**
- **Local Government,**
- **The Department of Transport, the Arts and Urban Planning**

**These guidelines have been published by The Department for Primary Industries and Resources, The Environment Protection Authority, South Australian Farmers' Federation and the Murraylands Regional Development Board to assist in the uniform development of an economically and environmentally sustainable intensive pig industry in South Australia.**

The prime purposes of this booklet are;

- to provide all intending developers of intensive piggeries with a clear statement of objectives, standards, practices and requirements which will assist in acquiring planning approval and the satisfactory commercial and environmental operation of future intensive piggeries, and,
- to assist Local Government in developing policies for their Development Plans and providing information for assessment of development applications for intensive piggeries

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These guidelines are intended only as general information, and should not be taken as constituting either legal advice or policy of the South Australian Government on the application or construction of relevant legislation in any particular circumstances.

The information contained in these guidelines was correct at the time of publication, and no responsibility is taken for any changes since publication, that may affect the accuracy of these guidelines.

It is the responsibility of every person potentially affected by applicable legislation to determine, with or without private advice, the rights and responsibilities pertaining to their particular circumstances.

No liability will be accepted for reliance on the contents of these guidelines.

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# 1. INTRODUCTION

These “Guidelines” apply to the development of all new intensive piggeries and any expansion to existing intensive piggeries.

The guidelines have been compiled by representatives from The Department for Primary Industries and Resources; Environment Protection Authority; The Department of Transport, the Arts and Urban Planning; The South Australian Farmers’ Federation; The Office of Local Government; The Murraylands Regional Development Board and Local Government.

The demand for development of these guidelines for intensive piggeries has arisen from the increasing acceptance of the need for orderly development, sustainable landuse and adoption of best management practice. There is an ongoing need to maintain and enhance the status of natural resources. Water quality and use is an enduring issue in this State’s very dry environment.

The development of intensive piggeries can lead to the generation of large amounts of effluent which need to be utilised and managed in an environmentally sustainable manner, rather than viewed as a potential problem by-product.

These guidelines reflect the commitment of all interested parties, including State and Local Government, industry and rural development organisations, to work together to achieve the properly managed growth of the pig industry.

This document has been prepared to complement the legislative requirements of the State and enhance the administrative arrangements between Local and State Government authorities responsible for administering the establishment and effective operation of the pig industry.

Potential producers and other persons having an interest in the establishment and control of intensive piggeries are advised to contact their local council at an early stage to ascertain the requirements relating to the development of piggeries in their area.

*Advancements in husbandry techniques, animal welfare and utilisation of effluent will occur resulting in continual improvements in environmental and management standards. Wherever suitable, the adoption of these new developments are encouraged and should be included wherever possible when preparing development applications.*

## 2. DEVELOPMENT PLANNING PROCESS

### 2.1 Introduction

The integrated planning system in South Australia is designed around the need for the State Government, local government and the community to plan ahead. This gives people wanting to undertake development a reasonable degree of certainty and provides the community with a clear understanding of the ground rules for development while protecting the environment.

Key components of this system include:

- The Planning Strategy which sets out the State Government's vision for development in the State and for the regions within it;
- Development Plans which implement the Planning Strategy by setting out detailed planning policies for each Council area; and
- Development assessment where decisions on development applications are made based on the policies in the relevant Development Plan.

### 2.2 Planning Strategy for South Australia

The Planning Strategy presents current State Government policy for development in South Australia. The Development Act 1993, requires that Development Plans *should seek to promote the provisions of the Planning Strategy....* Development proposals, including those for intensive piggeries, are assessed against the policies contained in a Council's Development Plan to determine whether planning approval should be given to the proposal or not.

Clear planning strategies will indicate the types of development to be encouraged in particular areas. While the documents comprising the Planning Strategy should be read as a whole to provide the wider picture, strategies of particular relevance to piggeries include:

- *Amend Development Plans by introducing performance standards based on industry requirements, land capability and resource management for new, sustainable development in rural areas (and) plan for piggeries based on local and export market demands; and*
- *Align land use planning with regional economic development priorities for key industry sectors.*

The Planning Strategy also recognises that the intensive primary industry sector (including piggeries) *needs careful planning in terms of pollution controls and buffers to residential development.*

### 2.3 Development Plan Policies

Planning policies contained in a Council's Development Plan should seek to promote the provisions of the Planning Strategy. Where the development of intensive piggeries is recognised in the Planning Strategy, Councils in those areas have a firm base on which to establish policies which facilitate piggeries in appropriate locations.

These "Guidelines" could be used by Councils to assist in the preparation of planning policies for piggeries for inclusion into Councils' Development Plans.

Clear objectives and principles of development control facilitating piggeries could be included in appropriate zones. Policies could also be established that provide the necessary environmental, social, economic and land management safeguards.

Consideration could be given to listing piggeries as a complying form of development within appropriate zones, subject to compliance with a range of quantitative performance standards. Alternatively, piggeries could be considered on merit, having regard to the relevant planning policies.

Consideration could also be given to the category of public notification and consultation required for piggeries. Depending on factors such as location and siting it may be appropriate to list piggeries (if neither a complying or non-complying use) as Category 2 in terms of public notification and consultation. This category does not provide for third party appeal rights.

Depending on the level of encouragement that a Council and the community desires to give to piggeries, consideration could also be given to listing incompatible uses within a certain distance of piggeries as non-complying (prohibited). Such controls may be to prevent rural living or residential development in close proximity to piggeries, thus reducing the potential for impacts and complaints.

These sorts of policies would provide clear guidance to the developers and the community about the type and nature of development that can be expected in a particular area.

## **2.4 Development Assessment**

Acts or activities defined as development can be undertaken with a development approval. Development includes a change in the use of land and building work. To obtain a development approval, a proposal is assessed with regard to its conformity and consistency with the Council's Development Plan.

The Development Regulations 1993 include piggeries under the definition of 'intensive animal keeping' ("intensive animal keeping means the keeping or husbandry of animals in a broiler shed, chicken hatchery, feedlot, kennel, piggery, poultry battery or other like circumstances, but does not include horse keeping").

Intensive animal keeping is excluded from the definition of 'farming' and, accordingly, piggeries are considered a change of land use from general farming and therefore require development approval from the relevant authority. In most instances this will be the local Council.

A development application should be made on the standard application form and lodged with the relevant Council. These forms are available from all Councils and the Development Assessment Commission. Appendix 2 provides an example of the application form. Appendix 4 shows the typical information requirements for a piggery that should accompany the application. However, application requirements should be discussed with Council officers before proceeding.

Council will then determine the nature of the proposed development (ie is it intensive animal keeping in the form of a piggery or some other type of development?) and will be in a position to decide:

- the kind of development (complying, non-complying, or development for consideration on merit);
- the relevant authority for the application;
- whether the application needs to be referred to prescribed bodies or other government agencies; and
- whether the public needs to be notified of the application.

If the development is listed as a complying development in a Council's Development Plan or the Development Regulations, the Council must grant development approval.

Non-complying development is also listed in the Council's Development Plan. Whilst a development approval can still be sought it is more difficult to obtain.

Development for consideration on merit refers to any development that is not listed as either complying or non-complying development. It is assessed by the relevant Council having regard to the objectives and principles of development control within the Council's Development Plan. In its assessment the Council must not grant development approval if the proposed development is seriously at variance with the Development Plan.

Council will determine any consultation or referrals with State agencies deemed necessary. Agencies normally have 28 days to respond.

In relation to piggeries, if a piggery falls within the criteria defined in Schedules 21 and 22 (activities of environmental significance and major environmental significance) of the Development Regulations, the application must be referred to the Environment Protection Authority (EPA) for advice.

A Council must have regard to the EPA's advice in relation to piggeries of a size defined in Schedule 21, which are:

- (1) more than 1000 but less than 5000 pigs at any one time; or
- (2) where the structures are situated in a water protection area (as defined for the purposes of the Water Resources Act 1997), with more than 100 but less than 500 pigs at any one time.

The EPA has four weeks to respond.

However, in relation to piggeries of a size defined in Schedule 22 which are:

- (1) 5000 or more pigs at any one time; or
- (2) where the structures are situated in a water protection area (as defined for the purposes of the Water Resources Act 1997), with 500 pigs or more at any one time;

the Council must comply with any direction given by the EPA. In this instance the EPA has six weeks to respond and may direct the Planning Authority to refuse an application.

A map depicting the Water Protection Areas of South Australia is shown in Appendix 10.

The need for public notice and consultation of the development application will be determined by Council in accordance with stated criteria.

Three categories of public notice and consultation are set:

- exempt from any form of public notification and consultation (category 1 development);
- subject to a personal notice to abutting owners (category 2 development); or
- subject to general public notification, with attendant appeal rights (category 3 development).

A Council, in deciding whether to grant a development approval, must have regard to:

- (1) the provisions of the relevant Development Plan.

Typical provisions in a Development Plan for a piggery proposal may relate to:

- The intensity of land use proposed;
- Management methods and practices to be used;
- Impact on adjoining uses: distance from townships and neighbouring dwellings, transmission of disease, need for buffers, etc;

- Potential for pollution or other health hazards;
- Odour: prevailing wind directions, local meteorological conditions, etc;
- Water: distance from rivers, bores, wells, reservoirs, underground supplies, nutrient loads, surface run off etc;
- Land: soil deterioration, denudation, waste disposal methods, erosion, dust, etc;
- Waste facilities and methods of disposal: storage capacities, operation and maintenance of facilities, hygiene standards, disposal of dead animals, pest control, storm water, etc;
- Impact on the amenity of the area: siting, design and appearance of buildings, landscaping, proximity to roads, maintenance, concentration in one locality, etc;
- Suitability of access, types of vehicles, on-site provision for loading or unloading of vehicles;
- Suitability of fencing, pens, animal security etc;
- Site suitability; size of holding, slope, water logged or flood prone, etc;

Building construction standards;

- (2) any comments by a State agency or a referral body; and,
- (3) any representations received as a result of public notification and consultation on the application.

In addition, the Council must also comply with any directions made by the EPA if the proposal is listed in Schedule 22 of the Development Regulations.

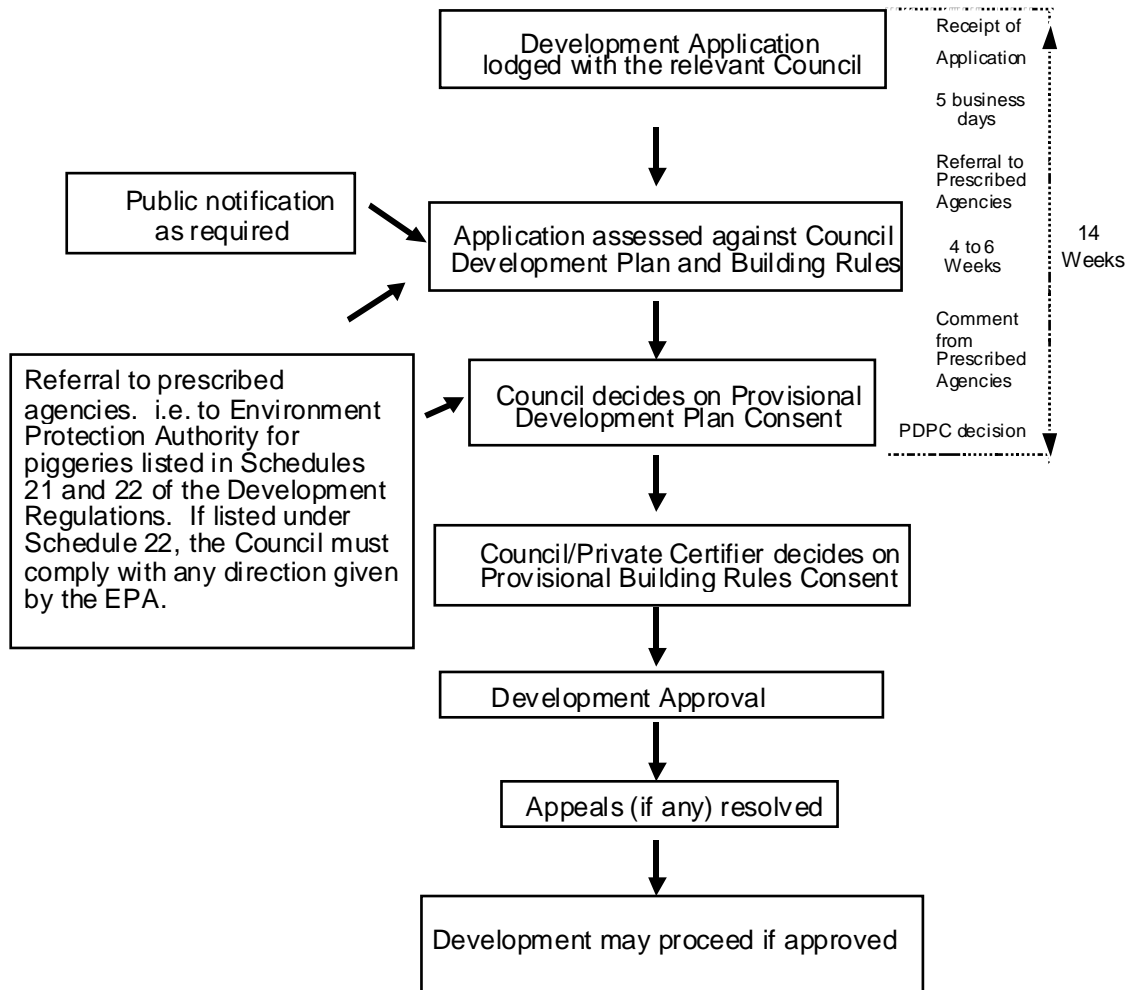
The Council should make a decision on an application:

- generally, within 8 weeks;
- involving a State agency report, within 12 weeks; and
- involving a referral body, within 14 weeks.

Appeal rights to the Environment, Resources and Development Court may apply for the applicant and third parties who made representations on the application.

Once appeals (if any) have been resolved, the development may proceed if approved. This process is described in the following Planning Approval Flow Chart.

**FIGURE 1: TYPICAL DEVELOPMENT APPROVAL FOR A PIGGERY**



Note: Under the Development Regulations 1993 a piggery is included in definition for 'intensive animal keeping'. (ie intensive animal keeping the keeping or husbandry of animals in a broiler shed, chicken feedlot, kennel, piggery, poultry battery or other like circumstances, but does not include horse keeping).

## 2.5 Environment Protection Act 1993

On 1 May 1995, The Environment Protection Act was proclaimed. Under this Act, all people have a general duty to minimise environmental harm. The objects of this Act include

- (a) *to promote the following principles ("principles of ecologically sustainable development"):*
  - (i) *that the use, development and protection of the environment should be managed in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being and for their health and safety while—*
    - (A) *sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and*
    - (B) *safeguarding the life-supporting capacity of air, water, land and ecosystems; and*
    - (C) *avoiding, remedying or mitigating any adverse effects of activities on the environment;*
  - (ii) *that proper weight should be given to both long and short term economic, environmental, social and equity considerations in deciding all matters relating to environmental protection, restoration and enhancement; and*

The Act is managed by Environment Protection Authority, 77 Grenfell St, Adelaide and can be contacted by telephone on 08 82042000.

Under Schedule 1 piggeries are defined as an activity of Environmental Significance as follows and as such need a licence under the Environment Protection Act 1993.

### **Animal Husbandry, Aquaculture and Other Activities (5)**

**(4) Piggeries:** the keeping or husbandry in confined or roofed structures of

- (a) 5 000 or more pigs at any one time; or
- (b) where the structures are situated in a water protection area (as defined for the purposes of the *Water Resources Act 1997*)—500 or more pigs at any one time.

Application for a licence must be made to the Environment Protection Authority. A copy of the application form is shown in Appendix 3.

When the complete application is received, the proposed development is advertised as required under the Act. A licence, with appropriate operating conditions, may then be issued.

A licence may only be granted if the development has valid development approval. If the development has received approval through the process described in section 2.4, with referral to the EPA under Schedule 22 of the Development Regulations 1993, the EPA **must** grant the licence.

## 2.6 Buffer Areas

Buffer areas or distances (essentially required separation distances between incompatible uses) are legitimate planning tools which can assist in dealing with impacts generated by effluent, odour, noise and other wastes from production processes associated with intensive piggeries. In general planning practice, they are used to ensure long-term protection for both the area impacted upon

(ie neighbouring residences) and the conflict generating activity. Uses compatible with piggeries could be located in these buffer areas.

All rural land holders have an obligation to the community to manage their land and activities in a manner that maintains its productive capacity, safeguards the safety and health of employees and neighbours, and avoids environmental harm.

Conflict in rural areas can arise between rural activities as well as between rural and residential activities. While there is a clear responsibility on piggery operators to exercise a duty of care to the environment and their neighbours, certain activities practised by even the most careful and responsible operators may still have an impact on adjacent uses. Provided activities are legally practised according to approved codes and standards, it is considered unreasonable for adjacent uses to demand a modification of these activities to an extent which threatens efficient operations.

More detailed discussion on the establishment of buffer distances is contained in section 7 “Buffer Distances”.

### 3. ESTABLISHMENT

The main elements to be considered for the development and operation of an intensive piggery are in the following section sequence of:- Site Selection, Housing and Construction, Effluent Treatment and Utilisation, Buffer Distances and Operation and Management Requirements. Each section specifies **Objectives**, **Accepted Impact Standards** and for some **Approved Operating Practices**.

### 4. SITE SELECTION

#### 4.1 Objectives

- To ensure that noise, odour, visual impact, dust and flies do not cause unreasonable interference to the community;
- To minimise any adverse impact on adjoining land uses and the natural environment of the area;
- To ensure that soil, surface and ground waters do not become contaminated by the piggery development;
- To ensure that the piggery complex, including buildings and lagoons, are not subject to a flooding frequency greater than 1 in 100 years;
- To ensure that there is adequate provision for the loading, unloading of pigs, equipment and supplies and parking of vehicles on site. Also that there is sufficient infrastructure services, particularly roads.

#### 4.2 Accepted Impact Standards

That there are adequate buffer zones available from neighbouring houses, towns, waterways and the underground water table (see section 7);

That there is no loss of agronomic production due to degradation of soil and water by nutrients from the development;

That the land is not subject to a flooding frequency greater than 1 in 100 years;

That the site has adequate on-site parking and there is suitable access to the piggery.

#### 4.3 Approved Operating Practices

It is strongly recommended that before a decision to purchase land or proceed with the establishment or extension of a piggery that the suitability of a particular site be discussed with the Local District Council, the Environment Protection Authority and The Department for Primary Industries and Resources;

Piggeries, and their associated effluent disposal systems, should be sited, designed, constructed and operated so as not to cause unreasonable interference with the comfortable enjoyment of life and property off-site, or with off-site commercial activity. In this regard, special consideration should be given to visual impact, odour and noise above appropriate levels, and to off-site transport effects.

Siting has a significant effect upon the intensity and cost of effluent treatment, and the management that would be required to protect water quality. Carefully planned siting of facilities, particularly the effluent utilisation areas, facilitates the environmental management of an

operation. Where possible, the site selected should be one that avoids the need for costly environmental measures, and which ensures preservation of community amenity.

#### **4.4 Siting of the Piggery Complex**

Siting of **new operations** should consider:

- The amount of land required for establishing the enterprise;
- The presence of soils suitable for sealing effluent ponds;
- The need for a buffer from other piggeries to provide adequate protection against disease transfer between piggeries;
- Any potential need to control future development in the buffer area (eg to minimise risk of disease transmission or odour complaints). Methods to achieve this could be by entering into long term agreements with adjoining landholders, purchase of the land in the buffer area or by Council controlling development through appropriate policies in its Development Plan;
- Proximity of services and amenities including water and power supplies;
- Proximity to feed supplies and abattoirs;
- Climate (including rainfall, prevailing winds) and topography;
- Avoiding land subject to flooding, as defined by a flood frequency of 1 in 100 years, and waterlogging;
- The need to locate the complex at least 100 m from a watercourse (see section 7.1);
- Proximity to neighbouring dwellings (see sections 7.1, 7.2);
- Availability of labour. Piggeries demand a high level of managerial expertise to achieve high levels of production required to service debt and return acceptable levels of profitability. The availability of competent piggery staff and support industries may impose limits upon piggery location.

##### **Access:**

##### **Arterial Roads**

The primary concern of the Department of Transport, the Arts and Urban Planning is to ensure access to a development is safe and convenient. A large piggery operation is likely to generate a substantial volume of traffic, especially large delivery vehicles and should the property have frontage to more than one road, all access should normally be via the less trafficked road. Should the junction of this road be under the care and control of the Department of Transport, the Arts and Urban Planning and require upgrading to cater for the increase in traffic generated by the piggery, then the junction would need to be designed and constructed to the satisfaction of the Department.

##### **Local Government Roads**

The suitability of the roads for the potential increased heavy vehicle traffic flow generated by the development should be discussed with the local council.

Other requirements for consideration include:

- The development, including signs, should be fully contained within existing property boundaries;

- Adequate on-site parking, and where appropriate, commercial vehicle parking should be provided;
- Sufficient on-site manoeuvring areas should be provided to enable all vehicles to enter and exit the site in a forward direction;

Discussions, as early as possible, should be held with the Planning Engineer, in the Planning Liaison Section of the Department of Transport, the Arts and Urban Planning to determine the availability of access to the piggery.

**Noise:**

Noise from piggeries is mainly associated with the feeding operations. The noise generated can travel large distances, causing considerable annoyance. Most modern piggeries have adopted ad-lib feeding systems that significantly reduce noise levels. Factors such as the number of pigs, type of buildings, feeding systems adopted and site topography will all influence the amount of noise emitted from the piggery, and its level of annoyance. Noise emissions from existing piggeries are controlled by the Environment Protection (Industrial Noise) Policy 1994 (See extract in Appendix 6). Other sources of noise associated with piggeries include vehicles, feed milling equipment and other machinery. These sources should be operated during daylight hours. However, during hot weather pigs may have to be moved or loaded at night or very early morning, with unavoidable noise generation.

With good management the buffer distances in Section 7 would generally give acceptable noise levels at neighbouring houses.

**Odour:**

Odours associated with intensive pig keeping cannot be completely eliminated and therefore siting and good management practices of piggeries are critical.

Odours can originate from the following sources:

- The piggery itself;
- The waste collection and treatment system;
- The waste disposal system.

Odours from piggeries are mainly due to manure decomposition. The exact nature and effect of odour is affected by type of pig feed, housing and effluent treatment system.

The highest odour levels and greatest impact on the community are likely to occur in hot, stable weather conditions. Some complaints may be associated with particularly odorous practices of the piggery and not directly related to the temperature; eg. pond de-sludging, landspreading.

Piggery odour problems can also occur at night due to light winds and radiation inversions often associated with katabatic drainage flows to low lying sites down valleys. Piggery site selection therefore needs careful consideration of topography, meteorological conditions, land uses, sensitive receptors and effluent treatment systems

Odours from the piggery itself can be partially eliminated through regular cleaning, and by maintaining a high level of house-keeping, but a background of odours from the pigs and their feed will remain.

See Sections 5 and 6 for further strategies for odour minimisation.

## 4.5 Water Requirements

Pigs must have access to a continuous supply of cool, clean fluids suitable for drinking.

A guide to total piggery water usage (ie. drinking, spillage, cleaning and cooling) for a breeding unit taking pigs through to bacon weight is 120 - 250 litres per sow place per day.

It is recommended that bore and dam water supplies should be analysed on a site specific basis as water quality can be impaired by high levels of salt, bacteria, algae or other contaminants.

- Salt levels in water up to 3000 ppm are considered to be manageable;
- Bacterial contamination can occur as a result of effluent run-off draining into the piggery
- water supply and every effort should be made to separate fresh water dams from potential faecal contamination from either pigs or other stock. Levels up to 200 faecal coliform bacteria per 100 ml water are considered acceptable.

Algal blooms can occur in water exposed to light, most algae in water is non-toxic, however Blue Green Algae can be toxic to pigs. If this algae is diagnosed in the water supply, another source of water is required until the algae is treated chemically and the algae and toxins removed.

If the piggery is sited in a “Prescribed Wells Area, Prescribed Surface Water Area or Prescribed Watercourse” then a licence is required to take water. Application for the licence can be obtained from the Water Resource Group in Department of Environment and Heritage. See Appendix 10 for a list and map of these areas.

## 4.6 Siting and Managing the Effluent System

The amount of land required for establishing the enterprise should include consideration of:

- The proposed treatment, storage and application of piggery effluent, and or solid wastes on or off-site;
- The need for appropriate buffer areas between the intended enterprise and sensitive areas, including ground and/or surface waters and residences;
- Estimation of quantity and quality of piggery effluent and solid wastes produced at all stages of the process (see section 6);
- The assimilative capacity of the soil and crops.

Existing operations with site constraints (eg high watertable, incompatible land uses, size of site) should implement the following:

- Innovative and effective technologies to minimise effluent output and allow for its re-use;
- Effective house-keeping, design of plant and equipment, and best practice management;
- An effective monitoring system to enable potential problems to be detected early.

### **Ground/Surface Water Impacts:**

Sites should not be used for disposal of piggery effluent if sub-surface drainage is likely to cause rising groundwater tables, land salinisation or increased nutrient levels.

To minimise surface runoff and soil erosion, effluent should not be spread on land that is:

- Immediately adjacent to streams and watercourses (see table 7.11);
- Subject to flooding at a frequency greater than 1 in 5 years.(flood risk analysis should be undertaken);
- Waterlogged or saline;

- Sloping with inadequate groundcover;
- Rocky and highly erodable;
- Of highly impermeable soil type.

Effluent lagoons should be designed and constructed to prevent potential pollution of surfacewater through runoff and designed to prevent leaching to the groundwater.

Groundwater issues to be considered are:

- The level of the watertable;
- Groundwater quality;
- Current and potential usage.

Hydrogeological expertise may be required to evaluate the characteristics of the groundwater beneath the site and/or land application area. Rising groundwater, bringing increased salt levels to within the root zone and possibly causing waterlogging is unlikely where piggery effluent is applied to dryland crops and pastures in permeable soils with a substantial separation between surface and watertable.

When a proposed effluent disposal area, or part thereof, contains land which has a slope of 10 percent or greater, a check should be made to determine whether there is sufficient land (either on or offsite) of a lesser grade which is capable of absorbing all the effluent which will be produced from the piggery on a year round basis.

#### **Stormwater Management:**

Stormwater from surrounding land should be prevented from entering the piggery site. A “contour bank” or comparable embankment maybe needed upslope from the piggery complex to divert this intermittent entry of stormwater.

Clean runoff from shed roofs should be kept out of the effluent stream and diverted to outside the area of the piggery complex.

Contaminated water generated within the piggery complex eg from raceways should be disposed of in an appropriate manner and kept out of freshwater dams. Only small volumes of such stormwater can be drained to the effluent ponds.

## **4.7 Future Expansion**

When establishing a piggery, attention must be given to future expansion plans. This not only involves careful site selection but also requires a piggery design that allows expansion at minimum cost and disruption.

Future expansion should be considered in the development application for new piggeries with thought being given to the availability of suitable land for buffer distances as they would be required for the future expansion options. Where practical this land should be owned by the developer as future change of landuse within the buffer zone may reduce the opportunity to expand.

An application for staged development can be considered under the Development Act. With prior consultation and agreement with the appropriate planning Authority or Local Council, time frames for completion of a development can be extended under this legislation.

## 5. HOUSING AND CONSTRUCTION

### 5.1 Objectives

- To ensure that the welfare needs of the pig are met;
- To ensure that the technical requirements of the building rules are met;
- To ensure that there is no adverse visual impact.

### 5.2 Accepted Impact Standards

That the housing requirements reflect the minimum standards as recommended by the Australian Model Code of Practice for the Welfare of Animals - The Pig;

That the requirements, as per the classification, of the Building Code of Australia are met. Check with the local council for their assessment of the classification of the piggery building under this code;

That the development is of an acceptable community visual standard.

### 5.3 Approved Operating Practices

The pig house must meet the pigs' requirements and also provide a safe working environment for the piggery operators.

### 5.4 Housing

Before designing a building, consider the type and number of pigs to be housed and the pen sizes, shapes and positions in the building. This will provide the overall building dimensions. Once this has been determined then the orientation, style and building materials can be established.

Intensive piggeries generally house stock in pens on concrete floors with slatted or open channel dunging areas. Slats are made from concrete, steel mesh or plastic. Sheds often have separate areas for mating, gestation, farrowing, weaners and growers. Larger units will commonly use separate sheds for each section of the piggery.

Pig housing should provide an environment that meets the pigs needs for temperature, ventilation, space and feed and water access for each stage of growth. The environment should allow the pig to express its genetic potential to grow and convert feed into lean meat. It also should provide a safe working environment for the piggery operators while safeguarding the welfare of the pigs.

A relatively new housing option to accommodate pigs is a low-cost, straw bedded shelter which is commonly called an "eco-hut" design.

#### **Space Allocation and Pen Requirements:**

Appendix 11 shows space requirements for pigs. These requirements reflect the minimum standards recommended by the Australian Model Code of Practice for the Welfare of Animals - The Pig.

Industry experience thus far show that typical stocking rates for "eco-hut" accommodation are 0.5 m<sup>2</sup> per weaner, 1 m<sup>2</sup> per grower and 3 m<sup>2</sup> per dry sow.

## **Shed Design:**

**Farrowing Section:** A typical pig shed design can contain the following features for farrowing accommodation:

- Protective side rails to reduce overlays;
- Freedom from draughts;
- A creep area to allow piglets to escape the sow and eat creep feed without the sow eating it or protective rails to prevent piglets being crushed against the sides of pen walls;
- Supplementary heat in creep area.

**Weaner Section:** Newly weaned pigs require suitable environmental conditions to counter the abrupt changes that occur at weaning. A change in diet from milk to solid feed, mixing with other pigs and a change of environment can stress weaners, making them more susceptible to disease. Weaner pigs must be weaned into a warm, dry, draught free environment.

**Grower/Finisher Section:** Grower/finisher housing can be described using two basic design types.

- **Pens in sheds** - This is by far the most common system of housing growers. Sheds offer protection from the elements for both the pig and the producer. Close control and supervision of stock is possible with this system together with the ability to regulate the environment;
- **Eco-hut design** - These sheds are a low-cost housing alternative where pigs are housed in a litter bedded shelter which is constructed upon compacted soil or concrete pad with solid walls and an arched tarpaulin type roof supported by a series of “D” frames. Care must be taken to ensure that there is no leaching to the water table and that a suitable method of disposal of the used litter is put in place (see section 6). This type of accommodation is relatively new to South Australia and generally suits all-in, all out production methods.

**Breeding Section:** Dry sows are generally housed in a combination of individual stalls and group pens. Stalls are often used for the first five weeks of gestation to allow for individual feeding and attention, sows may be moved to group pens to complete their gestation period. Group housing of sows in “barn” type sheds without pens is less common due to difficulties encountered with feeding and management.

## **Visual Impact:**

New buildings, whether they be additions to an existing facility, or are a completely new development should be designed with visual impact in mind. Form, colour, materials and landscaping are all elements that effect the visual impact of the development. Correct choices on these elements will result in the structures blending more readily into their surroundings.

## **Odour Minimisation:**

The following housing and pig management strategies are available to minimise the effects of odour:

- **Shed Orientations:** increasing temperature has a significant impact on odour generation. Buildings orientated with their long axis east-west will minimise the heat load;

- **Shed Positioning:** space naturally vented sheds from other buildings or trees by at least five times the height of the nearest building or large object, to maximise wind ventilation and thereby dispersion of odour;
- **Shed Construction:** construct new pig sheds from suitable materials to reduce shed temperatures and allow thorough cleaning;
- **Shed Ventilation:** adequate ventilation is required to remove piggery gases, dust and odour, to control air temperature and relative humidity, to remove excess heat and moisture, to dilute and remove airborne disease organisms and maintain oxygen supply to the pigs;
- **Pen Design:** the positioning of pen fittings and choice of materials can modify pig behaviour, resulting in cleaner pigs/pens and a less odorous shed. Type of flooring material affects pen fouling patterns and the ability to clean them properly;
- **Stocking Density:** has a large impact on thermal comfort, behaviour and performance of group-housed pigs. Overstocking results in fouling of lying areas resulting in increased shed odour;
- **Air Quality:** the dustier the pig unit, the more odorous it will be. About 2 percent of the weight of dust in a piggery is chemicals that, when lodged in the nose, will be smelt as odour. Piggery dust may be reduced through adequate ventilation, routine shed cleaning, controlling humidity to between 50-70 percent and reducing feed-borne dust through fat/tallow addition to diets, eliminating floor feeding, feeding pelletised feed and installation of automated feeding equipment;
- **Trees:** the strategic planting of shelter belts of trees around the piggery and effluent collection/handling area can improve public perceptions. Advice should be sought on preferred varieties and establishment techniques best suited to specific sites. In general, establishment success will be dependant upon adequate maintenance of the planting during the first year, with efforts focused on the creation of a weed-free seedbed and avoidance of frosts.

## 6. EFFLUENT TREATMENT AND UTILISATION

### 6.1 Objectives

- To ensure that there is sufficient capacity for the storage and treatment for all effluent from the proposed system;
- To optimise the use of effluent as a recyclable resource;
- To ensure that the nutrient, organic matter and water quality of piggery liquid and solid waste do not have an adverse impact on soil, surface and ground water;
- To minimise odour;
- To ensure there is minimal health risk to workers and neighbours.

### 6.2 Accepted Impact Standards

Ground and surface water quality to be maintained at a level which will permit existing and potential future uses to continue;

Agronomic production levels to be maintained and where possible enhanced;

Health and Safety training, protective clothing and equipment to be provided in accordance with the “Occupational Health, Safety and Welfare Act, 1986.

### 6.3 Approved Operating Practices

There are no *standard* formulae for estimating the volume and composition of piggery effluent and hence the design volume of piggery effluent ponds. There are many factors such as water use, feed type and spillage, volatile solids production rate, climatic conditions etc. which affect effluent content, production and treatment;

The area of land required for disposal by spreading is not only affected by these factors but also by soil type and permeability, spreading frequency, soil nutrient levels, crops grown, rainfall and depth to water table;

It is recommended that the values for the above factors are fully investigated and determined for each individual piggery before deciding on type of effluent disposal system;

The employer, must ensure so far as is reasonably practicable that the employee is, while at work, safe from injury and risks to health by adhering to the Occupational Health, Safety and Welfare Act, 1986.

### 6.4 General Aspects of Effluent Management

This section comprises information on the general methodology for designing an effluent management system for achieving the above objectives. The outcomes from effluent collection, pre-treatment, temporary or seasonal storage, disposal by evaporation or reuse, with particular emphasis on the sustainable application of piggery effluent onto farming land must result in sustainable effluent management.

Piggery effluent maybe moderately saline and its suitability to be used as an irrigation water supply for crops must be ascertained. However it contains valuable nutrients which can be utilised for plant production.

The principle of sustainable use of piggery effluent for fertilising farming land is to apply the appropriate (small) amount for achieving adequate levels of nutrients in the root zone which can be utilised by well yielding crops and pastures. Usually only a 'film' of effluent is required to supply adequate nutrients for the plants and therefore the amounts of salt added with the effluent is relatively small. The adverse effect of the salt is by far outweighed by the stimulated plant growth due to the nutrients supplied by the piggery effluent.

At the time piggery effluent is applied, the beneficial nutrients are not necessarily in an appropriate chemical form or ratio as required for plant growth. However soil micro-organisms readily convert the organically bound matter and thus release the nutrients for plant uptake.

Assessing the nutrient levels in the root zone at the time of sowing is sound farming practice. This is particularly essential where piggery effluent is used as a replacement for artificial fertiliser. Supplementary fertiliser, where required, may be applied whilst sowing to achieve optimum yields.

Where applicable, most of this agronomic information can also be used for reporting to Environment Protection Authority (EPA) on the impact of effluent use for plant production and its potential effect on groundwater quality.

The effluent management system chosen for a given piggery will depend on a host of variables eg location and size of the unit, type of the farming enterprise, climatic conditions for plant production, availability of suitable land, accessibility of such land in winter, benefits and cost of reuse, facilities, agricultural machinery and specialised equipment (if any) available on the farm and, ultimately, the environmental impact of the effluent management operations.

Besides causing no degradation of the environment, the piggery waste management system must be user-friendly to the farm workers who have to operate the system daily. The most important features of a well designed system of effluent disposal are safety, operation flexibility and simplicity ie requiring little supervision.

## **6.5 Effluent Management at the Piggery**

### **Outcome Sought:**

*The effluent released from the piggery buildings is effectively handled and treated without causing undue impact on the local environment: land, surface and groundwater degradation and odour nuisance.*

A well designed and managed system of effluent management, which includes monitoring and contingency plans (sections 8.3 and 8.4), will ensure the ongoing sustainability of the system.

Effluent treatment methods include solids separation by run-down screens, sedimentation and stabilisation in ponds and land application. As it is not easy for a multi-skilled farmer to design an effective system a consultant may need to be engaged for designing lagoons for large piggeries. Experienced operators should be readily accessible to resolve problems that may arise from time to time.

### **Effluent Characteristics:**

Assumptions used to conduct the various calculations needed for the design of piggery waste collection, pre-treatment and disposal systems include:

- (1) Estimated volume

Efficient use of water throughout the piggery, including recycling, minimises the volume of effluent produced and thus handling and storage requirements. The use of fresh water should

be minimised by effective waste removal, careful selection and adequate maintenance of pig watering systems and minimal water use for wash-down and flushing. As a guide, the daily effluent production of efficient piggeries is about 100 L / sow place where recycled flushing is practised, or up to 250 L / sow place when the waste drains are flushed with fresh water or nipple drinkers are used.

While the recycling of effluent for flushing is encouraged, professional advice maybe sought on the system's design and operation to avoid corrosion of metallic components, blockages of the reticulation system and causing pig health problems. Effluent for recycling is usually drawn from the aerobic pond of a conventional anaerobic / aerobic system.

The design of effluent channels should take into account efficient flushing with the least possible water usage. Stormwater including runoff from roofs should be kept out of the piggery effluent collection, treatment and storage system.

A crude way of estimating the effluent production is to monitor the (daily) water supply to the piggery by reading the mains water meter or measuring the draw down of storage tanks.

**Note:**

From a good management perspective, monitoring of the effluent production and performance of the ponds is essential. This is even more important where future expansion of the piggery is contemplated and thus causing extra effluent to be discharged into the existing ponds.

(2) Effluent composition

As no piggery operation is the same, it is almost impossible to predict the chemical composition of the effluent draining into the collection sump of a piggery.

A pig voids approximately 6 % of its body weight every day. It is thus possible to estimate crudely the chemical loading of the effluent ponds by using the following approximation:

Chemical loading rate (ie kg of element X per kL of diluted effluent) =

Piggery output (derived from Appendix 12) x 1 ÷ F

where Dilution Factor F = daily water use (in kL/day) ÷ (0.06 total herd live weight (in tonnes))

However, the excreted waste starts decaying as soon as hitting the floor and is further transformed after entering the (partially filled) waste drain and diluted by the flushing water. Major nutrient losses occur during treatment and storage in the ponds. Where effluent is applied to land, chemical analyses for the pond (from which the effluent is taken) are needed to estimate the nutrient application rate to the land and thus the potential value of the waste spreading operations.

To get the greatest return from the expense of the spreading activities by tanker, the effluent is usually drawn from the anaerobic pond and thus comprises a mixture of relatively fresh effluent and accumulated sludge.

Where a vacuum slurry tanker is used, the anaerobic lagoon should be agitated first before the tanker is loaded. When pumped via an underground pipeline to a travelling irrigator or centre pivot, the anaerobic effluent would have to be screened first so the risk of blockages in pipelines and nozzles is minimised. However the liquid for this system is usually taken from the aerobic lagoon.

Alternatively the effluent should be sampled when applied on the land by placing “catch” cans at one metre intervals across the spreading width. The effluent caught is then poured into one container and a sub-sample taken for chemical analyses ( at least: salinity, pH, and macro nutrients: Total N , P and K) by a certified laboratory. This information is essential for fine tuning the effluent spreading rate onto the pastures and crops to be fertilised (see Appendix 12).

### **Waste collection & screening:**

After opening the sluice gate, it is recommended that the effluent leaving the building to be collected in a sump be put through a coarse basket type screen to remove large foreign objects. The sump is usually equipped with an agitator for keeping the solid matter in suspension and an effluent pump which is triggered by pre-set level switches.

The water use in the piggery can be significantly reduced if the discharged effluent is used for flushing the waste drains by using either (fully) treated effluent from the aerobic lagoon or screened and settled (fresh) effluent. The latter option requires the effluent collected in the sump to be pumped over a screen and be stored in a nearby lagoon or tank. Any clarified liquid, surplus to flushing requirement, is conveyed to the treatment lagoons or immediately disposed of.

The “wet” screenings are piled on an impervious floor for drying; the liquid emitted by the stock pile is drained back into the collection sump. The pile tends to ferment and heat up to 70 oC. The internal heat generation does not cause self combustion but accelerates the drying. After about a week the screenings can be removed for direct spreading onto land or be collected for further processing eg composting.

In general, screening removes only the coarse fraction of the suspended matter in the effluent. Therefore the nutrient and organic matter load of the effluent is usually reduced by no more than 10 percent.

Separation performance is related to age of the effluent, with fresh material from flushing systems showing the highest solids and nutrient recovery. Handling capacities will vary according to screen size, evenness of flow over the screen width and shape/slope of the screen wires. Equipment specifications should be compiled before the design of the system is commenced.

It is noted that the effectiveness of screening and solids separation depends on the type of separation equipment used and effluent characteristics.

However, removal of solids from effluent increases the capacity of the treatment system through lowering the organic matter and nutrient content of the effluent. The solids are then more easily handled and moved off-farm if necessary, landspread or composted for later use.

Stationary inclined screens have proved most reliable in piggery situations, due to few moving parts, low power requirement and less likelihood of blockage. The capital investment for screening is quite high and therefore effluent screening is currently only practised at large piggeries or where there is a specific need or reuse opportunity for screenings. Removing solids of greater than one mm diameter reduces the risk of blockages in (underground) pipelines eg to a travelling irrigator or centre pivot. Effluent screening also increases the period between pond de-sludging.

### **Effluent ponds:**

The prime function of ponds is to store the effluent which is either used periodically for land spreading or left to accumulate over the years. Effluent ponds must be designed, constructed and maintained to contain the piggery effluent and hence prevent soil, surface and groundwater contamination. The second function, and not least important, of the ponds is to provide micro-biological treatment of the effluent in storage. The organic matter is converted into carbon and nitrogenous gases which are released to the atmosphere. Phosphorous, potassium, heavy metals and other substances are not volatilised but are either partially retained in the accumulating sludge layer at the bottom of the pond, or dissolved in the clarifying liquid.

For overall farm safety and animal welfare it is advised to fence off effluent ponds. Keeping stock out also prevents erosion of the embankments.

Effluent ponds are classified according to their function and nature of effluent treatment provided by the type of micro-organisms and their oxygen requirements:

#### **Anaerobic ponds**

The break down of digestible organic matter into mainly methane and nitrogen oxide gases can be undertaken by anaerobic micro-organisms which operate in an oxygen low environment. Therefore anaerobic ponds are deep and have a relatively small surface area. Most are between 4 and 6 metres deep. Adequately designed and operating anaerobic ponds can reduce suspended solids concentrations and BOD of the effluent by 70-80 percent. Some offensive odour is produced during the conversion of the fatty acids and peptoses.

Indigestible material gradually accumulates as a sludge at the bottom of the lagoon. The sludge build-up reduces the (active) treatment volume of the anaerobic lagoon and thus this needs to be allowed for when calculating the size of the pond. Anaerobic lagoons should be cleaned when the sludge has built up to about 60% of its original depth.

The development of a crust indicates that the effluent (ie Volatile Solids and Total Solids) loading rate has exceeded the treatment capacity of the anaerobic lagoon.

#### **Aerobic ponds**

These shallow ponds contain a bacteria population that requires a plentiful supply of oxygen, which is provided by diffusion at a relatively large surface area and by oxygen-producing algae contained in the pond. The main advantage of this type of pond is that aerobic digestion tends to be more complete and odour-free.

Pond depths over 1.2 m do not permit adequate sunlight for algal growth nor sufficient surface area for oxygen diffusion. Therefore the depth of aerobic ponds is usually 0.6 - 1.2 m.

#### **Facultative Ponds**

A facultative pond combines the features of anaerobic and aerobic treatment. This type of pond normally has an equivalent surface area to aerobic ponds but is deeper (1.5 - 2.5 m). Consequently the upper part of the pond is aerobic and the lower part of the pond acts anaerobically.

Facultative ponds often provide further treatment after the effluent has passed through the primary anaerobic pond where not enough treatment has occurred. Facultative ponds often provide temporary storage prior to land application and recycling of effluent for flushing. A

facultative pond also allows the maximum liquid volume to be maintained in primary anaerobic ponds for stabilising incoming effluent.

These ponds may emit offensive odour if the oxygen level in the top layer is not high enough and therefore the use of large facultative lagoons is discouraged unless a mechanical or chemical system is employed to ensure adequate oxidation of the surface layer at all times.

### **Sizing of ponds:**

#### **Anaerobic ponds**

The prime parameter for sizing the ponds is that they can store the volume of effluent generated during a pre-determined period. In that regard the daily water use of the piggery is a first guide to assess the minimum storage needed. Piggery effluent is usually stored over the winter months when the land is inaccessible for slurry tankers or insufficient land available due to crops grown or for protection of groundwater.

The lagoon will also receive rainfall in winter. It is recommended that lagoons are designed to have adequate storage capacity to avoid the pond overflowing in years with a less than a 10th decile (winter) rainfall. At sensitive locations pond overflowing may have a recurrence period greater than 10 years.

The sides of the ponds must have at least a 2:1 batter and a 600 mm freeboard is required to prevent erosion of the pond walls due to wave action. Consideration may be given for vehicular access for desludging operations.

The lagoons must not leak. An appropriate monitoring program for leakage should be provided when submitting development applications.

To meet occupational health and safety requirements and to prevent livestock from damaging lagoon banks fences around lagoons, to a standard to prevent easy access by farm stock and humans, are required.

The second, and almost equally important from an environmental perspective, criterion for the lagoon size is that there be enough volume for treating the effluent stream and storing the accumulating, slowly digestible organic materials.

There is no “standard” formulae for sizing anaerobic ponds as the treatment volume requirement depends on piggery specific factors such as water use, feed spillage, Volatile Solids (VS) production rate, location and piggery operations.

#### **Aerobic ponds**

The aerobic pond with its shallow water depth is usually filled by overflow from the anaerobic pond. The same construction details of batter and free board apply as given for the anaerobic ponds. A spillway may be incorporated for an orderly overflow in the odd (1 in 10 or more) wet year.

At the time of planning or expanding a piggery, it is essential to ascertain the relevant factors for the piggery, including a monthly water balance for the aerobic lagoon.

As stated earlier, it is not easy to design an effective pond system and therefore professional advice for lagoon sizing and design maybe an advantage for large piggeries.

**Solid waste storage:**

Solid waste from intensive piggeries usually comprise of wet screenings from the effluent stream, recovered sludge from ponds or the straw based-residues accumulated in eco-huts.

The solid waste needs to be stockpiled on a consolidated base such as compacted soil or concrete. Uncontaminated runoff needs to be excluded from the storage area. Any fluid draining from the storage area needs to be conveyed to the effluent ponds.

Retaining walls made from materials such as concrete or Besser block may be required to prevent fresh screenings from being washed away from the stockpile.

**6.6 Effluent Spreading on Farming Land**

Effluent spreading onto farming land can be an effective method of disposal and can be sustainable and profitable. However it is noted that soils do not have an unlimited capacity for receiving effluent because of the salt, nutrients and trace elements content. The soil processes for converting effluent needs oxygen and hence the soils can be overloaded. Therefore, effluent spreading programs should be designed to obtain maximum benefit from its fertiliser value while avoiding overloading of the soils and contamination of ground or surface water.

**Outcome sought:**

*Piggery effluent is used as a replacement for artificial fertiliser for plant production, whereby the nutrients, organic matter and water contained in the liquid, screened solids, residual sludge of the ponds, manure and straw from eco-huts are utilised by the crops and pastures in an environmentally sustainable manner. In this way the land capability of waste utilisation areas is maintained and where possible enhanced.*

The land spreading of piggery waste should not cause:

- soil structure decline;
- salinisation;
- acidification;
- waterlogging;
- chemical contamination;
- soil erosion;
- excessive, uneven or poor plant growth and yield loss.

Soil incorporation of effluent following application minimises nitrogen loss to the air and allows soil micro-organisms to quickly start decomposing the organic matter for subsequent use by plants. Incorporation also greatly minimises the potential for persistent odours. However incorporation of effluent must take into account the risk of soil structure decline and water or wind erosion.

Before spreading, it is advisable to consider weather conditions. Application sites should be selected downwind of neighbouring housing where ever possible. Morning applications are more desirable than late afternoon, which may limit drying times and thus minimising dispersion of any odours.

It is recommended accurate records be kept detailing application dates, times, rates and sites covered to assist in managing the effluent management plan and resolution of any complaints.

### **Effluent Spreading Plan:**

An effluent spreading plan should be developed to achieve the outcome as outlined in section 6.3. The plan should detail the following variables:

- Anticipated effluent composition;
- Estimated crop/pasture nutrient requirements;
- Proposed application rates and spreading schedules;
- Summary of spreading operations; timing and actual amounts applied to the farmland and calculated nutrient removal by crops or pastures derived from yield and basic chemical analyses;
- Record of soil salinity and nutrient status;
- Estimated impact on local surface and groundwater.

In an effluent spreading plan it is necessary to schedule correct timing and amounts of effluent applications. This will require analyses of existing nutrient levels in soils and effluent, an assessment of the availability of effluent nutrients and crop nutrient demand. Crop nutrient demand will vary with crop variety and yield, soil type and fertility and seasonal conditions.

Soil and plant tissue monitoring will readily identify the risk of land and (ground) water degradation: a build-up of soil salinity, too high levels of phosphorus and potassium in the soil and the risk of nitrate pollution of ground/surface water. The frequency and intensity of monitoring required will depend on piggery size, site sensitivity, effluent application history and trends identified from previous monitoring.

Application scheduling should be adapted to the site to prevent excessive leaching of effluent from the root zone. This can be determined by appropriate monitoring of soil and salinity profiles. Soils should ideally be medium clay-loam to provide reasonably good drainage and retention of nutrients. Sandy soils offer good surface drainage, but depending on depth to ground water, effluent disposal on such land may cause nitrate pollution of the underlying aquifers because sandy soils have a smaller nutrient retention.

The following procedure may be followed to prepare a field operational plan:

#### **Determine the composition of effluent available for spreading**

Where effluent is to be landspread via a tanker a knowledge of the level of total soluble salts (by EC), nitrogen, phosphorous and potassium content is required. This may be obtained by reference to suitable publications, see Appendix 13, or by having the effluent analysed.

#### **Monitor the soil nutrient status of the spreading areas**

Regular soil monitoring is needed to 'track' the nutrient status of paddocks and provide the information required to further fine-tune the management plan based on the actual soil nutrient status. The monitoring frequency will be dependent on the rate of application, crop uptake and soil type.

For cropping land subjected to effluent spreading by tanker, the minimum soil analyses are organic carbon, total nitrogen and phosphorus. Land only used for grazing and subjected to effluent spreading should also be analysed for potassium.

Plant tissue testing conducted during the cropping season will provide a further monitor of soil trace element status.

Both soil and plant analysis kits are available from all Primary Industries and Resources' offices and costs range from \$35 -\$50 per sample depending on the number of tests required.

**Estimate the soil nutrient removal based on crop variety and expected yields**

Nutrient uptake will vary with crop variety and productivity, soil type and fertility and seasonal conditions. Consequently it is not possible to give an exact nutrient profile which a specific crop can remove from soil. It is therefore recommended professional agronomic advice be sought in relation to those factors likely to impact upon nutrient removal rates at the regional level.

The Department for Primary Industries and Resources' Crop Nutrition Calculator is recommended as an aid in determining the nutrient removal rates of various crops according to yield. Contact Primary Industries and Resources' agronomists for further advice.

**Calculate the effluent application rate for each paddock**

The allowable application rate of any element to a paddock is the sum of the amount that can be stored in the soil and the amount removed by the crop. For paddocks on which effluent is to be spread, the maximum effluent loading rates is usually determined by crop nitrogen requirements and soil nitrogen reserves.

In either case, professional agronomic advice should be sought in fine-tuning final application rates, since up to 50% of the nutrients applied in the effluent may not be available during the year of application. Examples of the process to calculate these rates are in Appendix 12.

## 7. BUFFER DISTANCES

### 7.1 Objectives

- To ensure that noise, odour, visual impact, dust and flies do not cause unreasonable interference to the community;
- To ensure surface waters do not become contaminated by the piggery development;
- To provide a measure of protection and security of operation for the owner of the enterprise.

### 7.2 Accepted Impact Standards

That there is no unreasonable impact on the amenity of the locality and no contamination of waterways.

### 7.3 Approved Operating Practices

The most effective way of reducing the odour potential is by having good design, good management and appropriate buffer distances in place;

### 7.4 Introduction

This section on “Buffers” will give distances which have been found to provide the required buffers for piggeries, using present standard production technology, to prevent unreasonable impact on the amenity of the locality.

The composite site factors and the resultant buffer distances are given for a range of most existing piggeries and effluent management systems. *The values could be adjusted if there is a new technology which can be demonstrated and quantified to reduce odour.*

Environmental pollution such as water quality degradation, dust and odours can be controlled by good piggery design and management practices and by restricting pig numbers and maintaining suitable buffer distances between piggeries and impact areas. All activities which are likely to cause the increased emission of odours, such as manure spreading or effluent irrigation, should be performed at the time of day and under weather conditions which cause least odour emission and impact on neighbouring properties.

These guidelines provide a system of classification which will allow pig numbers to be varied according to the management standards proposed. The distance which the piggery must be from impact areas is not increased proportionally to the number of pigs being held but more in accordance with the probable pattern of odour dispersal. This means that large piggeries are not sited unnecessarily long distances away from impact areas.

The system proposed in the guidelines will assist planning authorities to provide tangible benefits to operators with proven satisfactory performance, and conversely downgrade the classification of the piggery and reduce pig numbers if standards of operation decline. Adoption of the buffer distance and pig numbers system will assist in minimising the environmental impact of piggeries. The indicated buffer distances are meant to cater for most existing types of piggeries and existing management practices. The buffer distances calculated could be adjusted if there is a new technology which can be demonstrated and quantified to reduce odour.

Buffer distances are measured from the closest point of the piggery complex to the closest point of the receptor -and consist of two parts:

- Fixed and
- Variable

The piggery complex includes all buildings where pigs are housed; adjoining or nearby areas where pigs are yarded, tended, loaded and unloaded; areas where animal wastes from the piggery are accumulated or treated pending removal or disposal; and facilities for feeding pigs are maintained or areas in which the feed is stored, handled or prepared.

## 7.5 Fixed Buffer Distance

Fixed buffer distance distances shall be the least horizontal distance between the boundary of the piggery complex and each of the relevant features as shown in Table 7.1.

**Table 7-1 Fixed Buffer Distances**

Public road - except as below	200 m
Public road - unsealed with less than 50 vehicles per day excluding piggery traffic	50 m
Major watercourse	200 m
Other watercourse as defined by a blue line on a 1:50000 current SA Government topographical map	100 m
Major water reservoir	800 m
Dairy	100 m
Slaughter house	100 m
Neighbouring rural residence	*200 m
Property boundary	20 m

\* This is a minimum fixed buffer distance. The variable buffer distance must also be calculated and the greater distance of the two applied.

## 7.6 Variable Buffer Distances 1

Variable buffer distances are based on the dispersion of odours from their source. They are used to determine allowable pigs numbers and management practices necessary to satisfy air quality objectives. A weighting scheme has been used to allow for different types of premises affected by odour.

### Number of Pigs and Size of Buffer Distance

The following Equation 1 provides estimates of the allowable standard pigs numbers **N** at any one time for a site at distance **D** metres from an impact receptor. Alternatively, Equation 2 specifies the distance **D** required between an impact receptor and a piggery having **N** standard pig units.

### Equation 1. Allowable pigs numbers.

$$N = (D / (50 \times S))^2$$

OR

## Equation 2. Buffer distance calculation

$$D = \sqrt{N \times 50 \times S}$$

N = Number of Standard Pigs Units.

D = Separation distance in metres between the closest points of the piggery and the most sensitive receptor or impact location.

S = Composite Site Factor

$$= S1 \times S2 \times S3 \times S4 \times S5$$

The factors S1, S2, S3, S4 and S5 relate to reduction factors, receptor type, topography and vegetation and can be determined from Tables 7.3, 7.4, 7.5, 7.6 and 7.7 respectively.

The pig numbers N referred to in equations 1 and 2 are Standard Pigs Units (SPU). A Standard Pigs Unit is defined as a grower pig in the range 26 - 60 kilograms live weight.

Piggeries either have a range of pigs from farrowing to finisher or cater for only one type of pig (eg growers only). Larger pigs usually produce more manure and hence have a greater potential for odour production. The guidelines allow the manure and odour potential of different weight pigs to be derived from SPU by the use of Table 7.2.

For a piggery growing from farrowing to finishers, the number of SPU can be estimated by the total number of (dry and lactating) sows times ten. Table 7.2 can be used for more refined calculations

**Table 7-2 Standard Pig Units Conversion Table**

Type of pig	Approximate Weight Range (kg)	Number of Standard Pigs Units
Boar	100-250	1.6
Gestating Sow/Gilt	160-250/100-160	1.8
Lactating Sows	160-250	2.5
Suckers/early weaners	1.4 - 8	0.1
Weaners	8 - 25 (16)	0.5
<b>Grower</b>	<b>26 - 60 (40)</b>	<b>1.00</b>
Finisher	61 - 100 (75)	1.6

The final pigs numbers are calculated from Table 7.2 using the approximate live weight and type. The total Standard Pig Numbers are calculated by multiplying the number of pigs in each class by the above conversion and then adding the totals.

### Example

1. For a piggery with 330 weaners, 250 growers and 250 finishers the total number of SPU is  $(330 \times 0.5) + (250 \times 1) + (250 \times 1.6) = 815$  SPU
2. For a 100 sow piggery which is growing from farrowing to finishers there are 1000 SPUs.

**Composite Site Factor – S:**

The value of S to apply in equations 1 or 2 depends on site specific information pertaining to the proposed shed design, maintenance schedule, population centres or homes and intervening terrain factors.

**Table 7-3 Odour Potential Factor S1**

	Value of <b>S1</b> <u>Odour Potential factors</u>	<u>Value</u>
<b>A</b>	<b>Type of building</b>	
	(1)Slatted floor and deep pit	1.0
	(2)Partly slatted floor and shallow pit or open drain with regular flushing	0.9 0.8
	(3)Partly slatted floor and sloping floor and regular flushing	0.6
	(4)Partly slatted floor and “pull plug” and recharge system	
<b>B</b>	<b>Ventilation of buildings</b>	
	(1)Limited ridge and side-ventilators (or side only) or limited forced (fan) ventilation	1.0
	(2)Ridge ventilators which are at least 90% of the length and are at least 10% of the width wide, and side ventilators are at least 90% of the length of the two long sides and at least 30% of the wall height, with roof and walls insulated or	0.90
(3)Fan forced ventilated shed with well designed uniform ventilation throughout shed	0.90	
<b>C</b>	<b>Effluent collection frequency within all pig buildings</b> Faeces, urine and other biological material removed from the confines of the buildings	
	(1)Greater than 24 hours	1.00
(2)While essentially aerobic but in no case greater than 24 hours	0.90	
<b>D</b>	<b>Effluent treatment system (within the piggery compound)</b>	
	(1)Anaerobic lagoon(s) (including all inlet pipes/channels)	1.00
	(2)Series lagoons anaerobic/aerobic (or facultative) and evaporation lagoons	1.00
	(3)Facultative lagoon(s) (including all inlet pipes/channels)	0.95
	(4)Aerated lagoon(s) (aerobic surface layer over entire lagoon)	0.75
	(5)Aerobic lagoon(s)	0.60
(6)No effluent storage within at least 500 m of the piggery	0.60	
<b>E</b>	<b>Feeding</b>	
(1)Conventional feeding	1.00	

(2)Phase feeding	0.90
(3)Phase feeding with optimal protein	0.80

Note 1 These guidelines call for a reasonably high standard at all piggeries, which is achieved by good management and control of odour generating procedures.

The above table gives factors which relate to the odour potential for different shed types and effluent management systems. Generally the factors would be 1.0 and lower. Hence if 1.0 is used in this Table the buffer distances will be the maximum and would be less for developments with lower potential odour emissions.

Note 2 The S1 factor can be no lower than 0.5

Note 3 The S1 factor could be adjusted if there is a new technology which can be demonstrated and quantified to reduce the odour.

Note 4 The S1 factor for Eco-huts stocked at recommended rates with good management practices is 0.5. Where stocked at higher rates and/or without good management the S1 factor is 0.75.

Note 5 Where different production systems, as defined above, apply within the piggery complex the S1 factors will be weighted according to the SPU within each system.

**Table 7-4 Value of S2**

<u>Receptor type</u>	<u>Value</u>
Large towns greater than 2000 persons	1.6
Towns greater than 100 persons	1.2
Small towns greater than 20 persons	1.0
Schools and similar with high institutional usage	0.8
Three (3) or more houses on separate allotments within a single radius of 250 m	0.6
Neighbouring rural residence	0.3
Public area (occasional use)	0.05

**Table 7-5 Value of S3**

<u>Terrain</u>	<u>Value</u>
Flat (less than 10% upslope and less than 5% downslope)	1.0
Undulating country between piggery and receptor	0.9
High relief (greater than 10% upslope from site) or significant hills and valleys between piggery and receptor	0.7
Low relief (greater than 5% downslope from site)	1.2
Valley drainage zone	2.0

**Table 7-6 Value of S4.**

<u>Vegetation</u>	<u>Value</u>
No tree cover	1.0
Light tree cover	0.9
Heavy tree cover	0.7

**Table 7-7 Value of S5**

<u>Wind factor</u>	<u>Value</u>
High frequency towards receptor (greater than 60%)	1.5
Normal wind conditions	1.0
Low frequency towards receptor (less than 5%)	0.7

Manure stockpile areas should be regarded as part of the piggery for the purpose of applying separation distances until evidence dictates otherwise.

For large piggeries, areas where there is more than one piggery, or piggeries with complex topographic or meteorological features the advice of a meteorologist or the planning authority may be required to establish the size of buffer distances and the number of pigs. For some large or complex situations on site meteorological data may be required.

## Application of Site Factors:

### Odour Potential Factor, S1

The factor S1 for each class of piggery will vary with the piggery design and maintenance and is determined from Table 7.3 by multiplying the factors together ie  $A \times B \times C \times D \times E$ . The S1 factor can be no lower than 0.5.

The reduction factor could be adjusted if there is a new technology which can be demonstrated and quantified to reduce the odour.

For Eco huts the odour potential depends on the stocking density. When calculating the space required consideration must always be given to the final or out going weight and age of the pigs. For a guide to minimum stocking densities see the following table. As new research data and further experience with eco-huts is gained then these stocking densities may be able to be adjusted.

**Table 7-8 Eco-hut Stocking Densities**

<b>Pig Age (Weeks)</b>	<b>Pig Weight (Kg)</b>	<b>Stocking Area (M<sup>2</sup>/Pig)</b>
3	6	0.2
6	13	0.3
9	24	0.4
12	35	0.5
15	50	0.7
18	65	0.8
21	82	0.9
24	102	1.0
>52	>160	3.00

### Receptor Factor, S2

The factor S2 will vary depending on the likely impact area and is determined from Table 7.4.

Impact location may be a neighbour's house, small town or large town that may be affected by odour generated at the piggery.

For a town the distance is measured from the closest point of the proclaimed town boundary. For a rural farm residence, the distance is the closest part of the residence itself, excluding any yards.

The value for a public area would apply to areas subject to occasional use. Higher values may be appropriate for public areas used frequently or sensitive in nature such as schools and frequently used halls and recreation areas. These should be assessed individually.

### Terrain Factor, S3

The terrain factor S3 varies according to topography and its ability to disperse odours and is determined from Table 7.5.

High relief is regarded as up-slope terrain or a hill that projects above the 10% rising slope from the piggery. Thus the receptor location will be either uphill from the piggery, be behind a significant obstruction or have significant hills and valleys between the piggery and the receptor.

Low relief is regarded as terrain which is generally below the 5% falling slope from the piggery. Thus the receptor will be downhill from the piggery.

A valley drainage zone has topography at low relief (as above) with significant confining side walls.

Topographical features of the selected site may adversely affect the odour impact under certain circumstances. During the early evening or night time under low wind speed conditions, population centres located in a valley complex at a lower elevation than a piggery may be subject to higher odour concentrations as a result of down-valley wind or the occurrence of low-level inversions. Unless site specific information has been gathered under conditions dominated by low wind speeds, the value for the factor S3 given in Table 7.5 should apply.

#### **Vegetation Factor, S4**

The factor S4 will vary according to vegetation density and is determined from Table 7.6. The vegetation density is assessed by the effectiveness of the of the vegetation stand to cause odour reduction by dispersion.

The tree cover may disappear during the life of the piggery requiring a change in pigs numbers at that time.

The aim of the vegetation is to act a buffer improving visual amenity, odour dispersion, dust reduction and noise attenuation. The values suggested for S4 given in Table 7.6 for tree covered areas should be used with care by regulatory bodies and a number of provisions should qualify an approval given on this basis. For example, no concession should be given for an intention to plant a barrier, and should an occupier fail to maintain a stipulated barrier then a reduction in the allowed number of pigs would be necessary.

#### **Wind Frequency Factor, S5**

The S5 factor is determined from table 7.7

The wind speed and direction, at most sites in South Australia, varies by the season and by the hour of the day. Although there is generally one direction that is the most frequently observed (prevailing wind), the wind direction usually blows from all directions at some time.

The wind can be classed as *high frequency towards the receptor* if the wind is blowing towards the receptor ( $\pm 40$  degrees) with a frequency of at least 60 percent of the time for all hours over a whole year.

The wind can be classed as *low frequency towards the receptor* if the wind is blowing towards the receptor ( $\pm 40$  degrees) with a frequency of less than 5 percent of the time for all hours over a whole year.

### Examples of Calculating Buffer Distances:

- (1) A new grow out piggery with 3000 growers and 2000 finishers. The piggery has pull - plug and recharge flushing, full ridge and side ventilation and phase feeding. The piggery is near a rural residence, on a flat site with some tree cover and normal winds. The site factors are as follows:-

Piggery is equivalent to 6200 Standard Pigs Units (Table 7.2)

The site factors are:

- S1 0.5 (Table 7.3)  
S2 0.3 (Table 7.4 Rural farm residence)  
S3 1.0 (Table 7.5 Flat topography)  
S4 0.9 (Table 7.6 Light tree cover)  
S5 1.0 (Table 7.7 Normal wind frequency)

Using Equation 2.  $D = \sqrt{N \times 50 \times S}$ , the minimum distance of the piggery from a rural residence is:

$$D = \sqrt{6200 \times 50 \times 0.5 \times 0.3 \times 1.0 \times 0.9 \times 1.0}$$
$$= 531 \text{ metres.}$$

- (2) The piggery is a farrow to finish piggery with partly slatted and sloping floor with regular flushing and full ridge and side ventilation. It is also 2500 metres from a town of greater than 100 people and on flat terrain with light vegetation cover and normal wind conditions

The site factors are then as follows:-

- S1 0.72 (Table 7.3)  
S2 1.2 (Table 7.4 Town greater than 100 persons)  
S3 1.0 (Table 7.5 Flat topography)  
S4 0.9 (Table 7.6 Light tree cover)  
S5 1.0 (Table 7.7 Normal wind frequency)

Using Equation 1.  $N = (D / (50 \times S))^2$  the maximum number of pigs allowed is

$$N = [2500 / (50 \times 0.72 \times 1.2 \times 1.0 \times 0.9 \times 1.0)]^2$$
$$= 4135 \text{ Standard Pigs Units or 414 sows}$$

### Two Piggeries in Close Proximity:

Where a second piggery is proposed (whether on the same or another property) the buffer or separation distance of the second piggery for a receptor type which is determined by equation 2 may need to be modified by one of the following methods:

- (1) For any receptor, if the two piggeries are closer together than half the distance of the shortest buffer distance from each piggery to the receptor calculated using equation 2, then the two piggeries shall be assumed to be one single piggery for the calculation of the appropriate buffer distance. For example, if two piggeries have individual buffer distance of 400 metres and 600 metres from a receptor, then they shall be assumed to be one piggery for the purpose of calculating buffer distance if they are closer than 200 metres

from one another. If the piggeries are further apart than 200 metres, they shall be treated as separate piggeries.

- (2) The buffer distance shall be increased by 20% for any receptor which lies within a radius from the first piggery which is 20% greater than the required separation distance for the first piggery. That is, the receptor is required to be outside of the overlap zones of the buffer distances from both piggeries which have both been increased by 20%. This is diagrammatically highlighted in Appendix 5. The buffer of the existing piggery is not affected for its current level of operation.

These calculations would need to be undertaken for all types of receptors to ensure that appropriate buffer distances are provided.

## **7.7 Variable Buffer Distances 2**

### **Effluent Treatment Systems or Land Disposal Areas:**

Buffer distances must be preserved between all effluent treatment systems or land disposal areas and sensitive features. They are in addition to the buffer distances for the piggery as described above and are calculated separately using Tables 7.9, 7.10 and 7.11. The buffer distances reflect the standard of treatment or method of disposal. Significant reductions in buffer distance distances accrue from those effluent treatment systems and waste disposal methods which reduce the production of odours.

Distances are measured from the edge of the effluent treatment systems or the effluent disposal area.

### **Effluent treatment systems**

Normally the effluent treatment systems are adjoining or near to the piggery in which case the effluent treatment systems buffer distances are satisfied by the buffer distances determined from Equation 1 or 2 except for the requirements for buffer distances from roads, water courses and property boundaries detailed in Table 7.9 and 7.10.

Buffer distances between effluent treatment systems which are remote from the piggery itself, by at least 500 m, and homes which are not under the control of piggery management are detailed in Table 7.9 and 7.10. The values indicated are applicable to systems which are correctly designed and operated.

The buffer distances are detailed for the following effluent treatment systems.

System A	Solids separation, anaerobic lagoon and aerobic lagoon and also Straw and manure from eco-huts
System B	Anaerobic lagoon and aerobic lagoon
System C	Anaerobic lagoon only
System D	Drying lagoons

**Table 7-9 Buffer distances surrounding effluent treatment systems****(For piggeries up to 5000 Standard Pig Units)**

<b>EFFLUENT TREATMENT SYSTEM</b>	Distance in metres			
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Large towns greater than 2000 persons	800	1000	1500	2000
Towns greater than 100 persons	500	500	1000	1500
Small towns greater than 20 persons	500	500	500	1000
Neighbouring rural farm residence not occupied by owner/staff of piggery	300	300	400	500
Public area (occasional use)	100	100	150	200
Public road - except as in table 7-10	100	100	150	200

For piggeries bigger than 5000 SPU the values in Table 7.9 shall be used but increased by the factor  $\sqrt{(N/5000)}$  where N is the number of Standard Pig Units whose effluent is stored in the effluent treatment system.

**Table 7-10 Fixed buffer distances surrounding effluent treatment systems**

<b>EFFLUENT TREATMENT SYSTEM</b>	Distance in metres			
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Public road - unsealed with less than 50 vehicles per day excluding piggery traffic	50	50	50	50
Major water reservoir	800	800	800	800
Major watercourse & Flood zone	200	200	200	200
Other watercourse as defined by a blue line on a 1:50000 current SA Government topographical map	100	100	100	100
Property boundary	20	20	20	20

### **Solid and liquid waste disposal to land categories**

Buffer distances are calculated using Table 7.11 for the following effluent disposal methods.

#### Disposal method A

- Discharge by injection directly into the soil at a rate not exceeding either the hydraulic or nutrient and salinity limits determined for the local soil types
- Irrigation of liquid pig effluent diluted at a ratio of 20:1 or greater and projected at a height of less than two metres.

#### Disposal method B

- Land receiving effluents that are “fresh” (ie. those that are less than 12 hours old) and having a solids content 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
- Solids that have been completely composted
- Effluent having a solids content of not more than 1%

### **Mechanical spreaders in combination with "ploughing-in" type equipment**

#### Disposal method C

- Downward effluent discharge nozzles

### **Discharged material is not projected to a height of more than 2.0 metres above ground level**

#### Disposal method D

- All effluent that is discharged or projected to a height in excess of 2.0 metres above ground level.
- Liquid effluent in which water remains visible on the soil surface for periods in excess of one hour.
- Separated solids or sludge (except fully composted solids) that remain on the soil surface for more than 24 hours ( are not immediately ploughed in)

Where more than one category of disposal to land is used the method which requires the greatest buffer distances is used to determine the buffer.

When waste is to be spread or discharged, account should be taken of actual and forecast wind conditions so as to prevent any waste being carried by the wind into the buffer distance, or the creation of an odour nuisance to neighbouring properties.

**Table 7-11 Buffer distances surrounding waste disposal areas**

<b>DISPOSAL METHOD</b>	Distance in metres *			
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Large towns greater than 2000 persons	500	1000	1500	2000
Towns greater than 100 persons	250	500	1000	1500
Small towns greater than 20 persons	200	400	500	1000
Neighbouring rural farm residence not occupied by owner/staff of piggery **	100	200	300	300
Public area (occasional use)	50	100	150	200
Public road - except as below	25	25	50	75
Public road - unsealed with less than 50 vehicles per day excluding piggery traffic	10	10	15	15
Major water reservoir	800	800	800	800
Major watercourse & Flood zone	100	200	200	200
Other watercourses as defined by a blue line on a 1:50000 current SA Government topographical map	50	50	50	100

\* If the wind is blowing towards a receptor, the buffer distance should be increased by 50 %

\*\* The distances for neighbouring rural farm residences can, on a daily basis, be reduced by agreement

## 8. OPERATING/MANAGEMENT REQUIREMENTS

### 8.1 Objectives

- To ensure that the welfare needs of the pigs are met;
- To ensure that a safe working environment is provided for the piggery operators;
- To ensure the on-going efficient operation of the piggery and prevent or minimise the risk of adverse effects on the environment.

### 8.2 Accepted Impact Standards

That all piggeries comply with The Australian Model Code of Practice for the Welfare of Animals - The Pig and the Australian Model Code of Practice for the Welfare of Animals - Road Transport of Livestock;

That the management of all piggeries comply with the Occupational Health, Safety and Welfare Act, 1986 and its associated regulations.

### 8.3 Approved Operating Practices

The health, hygiene and pest control practices outlined in this Section are a guide to achieving satisfactory management in these areas;

Each piggery should have a planned program of monitoring and reporting activities together with contingencies plans to prevent or minimise breakdowns or practices which may result in adverse effects on the environment, health or welfare of the animals and the workmen. The extent of the monitoring required is determined on the basis of piggery and property size, and the environmental sensitivity of the location.

### 8.4 Occupational Health and Safety

The Occupational Health, Safety and Welfare Act, 1986 provides for the health, safety and welfare of persons at work. The main objects of this act are:-

- to secure the health, safety and welfare of persons at work;
- to eliminate, at their source, risks to the health, safety and welfare of persons at work;
- to protect the public against risks to health or safety arising out of or in connection with the activities of persons at work;
- to involve employees in issues affecting occupational health, safety and welfare.

#### **Confined Spaces:**

No person shall enter an enclosed space used as a pit or manure storage area unless the conditions contained in the approved code of practice, AS 2865 are in place.

The most common gases found on pig units which can cause problems to people are:

- ammonia;
- carbon dioxide;
- carbon monoxide;
- hydrogen sulphide.

### **Noise:**

Under the Occupational Health and Safety Regulations 1995 “an employer must provide and maintain a workplace, plant and systems of work (including through the use of personal hearing protectors) to ensure that an employee is not, while at work, exposed to a noise level that exceeds the exposure standard.” “For the purposes of this regulation, the exposure standard is-

- an eight hour equivalent continuous A weighted sound pressure level,  $L_{\text{aeq } 8\text{h}}$  of 90 dB(A) referenced to 20 micropascals; and
- a linear (unweighted) peak sound pressure level,  $L_{\text{peak}}$  of 140 dB(lin) referenced to 20 micropascals.”

It is proposed that Government policy will reduce the  $L_{\text{aeq } 8\text{h}}$  to 85 dB(A).

### **Diseases:**

Piggery workers and operators need to undertake safe work and hygiene practices to protect themselves against any potential animal zoonosis. See Appendix 14 for an example of good hygiene procedures for piggery staff.

## **8.5 Environmental Objectives**

Piggeries need to be managed such that they are agriculturally and environmentally sustainable, acceptable to the community and comply with the objects of the Environment Protection Act 1993 (See section 2.5). Siting, good design and management are key elements in achieving sustained environmental performance.

Piggeries throughout South Australia irrespective of their size should seek to attain the following environmental performance objectives:

- **Waste Utilisation**

Piggeries should be managed so that the nutrient, organic matter and water values of piggery liquid and solid wastes are effectively utilised;

- **Land Protection**

Piggeries should be managed so that the cropping capacity of waste utilisation areas is maintained or improved; and so that lands are not degraded by soil structure decline, salinisation, acidification, waterlogging, chemical contamination and/or soil erosion;

- **Ground Waters**

Piggeries should be operated such that useable underground water resources do not become polluted by the piggery enterprise. Special consideration should be given to piggery structures, manure stockpile areas, effluent storage areas, effluent irrigation water or polluted rainwater;

- **Surface Waters**

Piggeries should be operated such that surface waters beyond the property boundaries do not become polluted by the piggery development. Special considerations should be given to piggery structures, manure stockpile runoff, irrigation runoff, stormwater runoff from waste utilisation areas, polluted sub-surface runoff, or discharge of polluted ground water;

- **Community Amenity**

Piggeries should be operated so as not to cause unreasonable interference with the comfortable enjoyment of life and property off-site or with off-site commercial activity. In this regard, special consideration should be given to odour, dust, flies and noise above appropriate background levels and to off-site transport effects.

Appendix 6 describes the Environment Protection (Industrial Noise) Policy 1994.

## **8.6 Monitoring and Reporting**

All piggeries must have a planned program of monitoring and reporting activities in the piggery to prevent or minimise breakdowns resulting in environmental, health or welfare problems. Ideally this should be developed in conjunction with appropriate authorities and reviewed periodically. Key parameters will vary with the size of the piggery but could include rainfall, feeding regimes, pen cleaning patterns, pig turnover, sickness, deaths, environmental impact, local complaints etc.

**All** piggeries should develop and maintain a plan to monitor their potential environmental impact. The extent of the monitoring would depend on the environmental sensitivity of the site and potential impact of the piggery. The plan should address, as a minimum, the potential impact to:

- ground water;
- surface water;
- effluent disposal on the soil;
- odour received by nearby landowners.

Generally the monitoring plan will consist of text describing the potential impact or lack of impact of the piggery on each parameter mentioned above. The plan should also describe what is to be monitored and how frequently. The plan may also include copies of suitable recording forms. The monitoring plan should be clearly written and results recorded, so that anybody can see how the impact of the piggery on the environment is measured and what the results from the past monitoring has been.

Some guidance to frequency of monitoring of the environmental factors is shown in Appendix 7.

Where piggeries, in the opinion of the Local Council or relevant State agency, are causing objectionable pollution or cruelty to animals, or are located at a sensitive site they could be subject to additional requirements for on-going monitoring and control.

The Environment Protection Authority may require, as a condition of licence under the Environment Protection Act 1993 or as a condition under the Development Act 1993, the monitoring program to be independently verified. Further information is contained in the Environment Protection Authority Technical Bulletin No 21, "Independent Verification of Monitoring Programmes", May 1996. A copy is given in Appendix 8

## **8.7 Contingency Plans**

Contingency plans are required to be part of management operations plans for the piggery and need to be drawn up prior to emergencies occurring. These plans spell out actions required to be taken when problems occur that have the potential to cause losses for the piggery or damage to the environment.

Some of the more obvious issues that require contingency plans in a piggery include:

- electricity supply;
- loss of water supply;
- specified disease outbreaks;
- interruptions to feed supplies, transport or abattoirs operations;
- effluent system overflow or escape.

Contingency plans need to be in writing and all staff need to be aware of actions to take in the event of an emergency. The plans also need to be trialed regularly to maintain their effectiveness.

Contingency plans should form part of Quality Assurance documentation and procedures and also be included in business plans for a new venture or major expansion.

## **8.8 Pests of Public Health Significance**

The main pests of intensive piggeries are flies, rats and mice.

Mosquitos may become a problem if shallow ponds are allowed to develop during effluent irrigation.

### **Pest Eradication:**

Eradication may involve an integrated program using physical, biological and chemical procedures. This should only be carried out following a survey to ascertain the extent and nature of the problem.

### **Routine Pest Control:**

This usually involves the use of chemicals (pesticides). As pigs are used for human consumption, persistent, cumulative pesticides must not be used in or around piggeries. Chemicals should be used as part of an overall control program and not be used to counteract poor hygiene.

### **Storage and Disposal of Containers of Toxic Substance:**

Care should be exercised in the storage and disposal of such materials to prevent any toxic substance entering any watercourse, either directly or by run off from land.

Regulations under the “Dangerous Substance Act” lay down storage conditions and the requirements for licensing of some pesticide stores.

A self-regulating container management strategy has been developed by AVCARE Ltd to ensure that containers have a defined route for disposal that is socially, economically and environmentally acceptable.

## **8.9 Animal Welfare**

The welfare of pigs is important and must be taken into account in the design and management of piggeries.

### **Welfare Code of Practice:**

The Australian Model Code of Practice for the Welfare of Animals - The Pig, which is endorsed by the Animal Welfare Advisory Committee in South Australia, provides guidelines for people responsible for the welfare of pigs.

The Australian Model Code emphasises that, whatever the form of husbandry, managers and others responsible for the day to day needs of pigs have a responsibility to care for animals under their control.

The Australian Model Code incorporates basic welfare needs of pigs including accommodation, food and water, general management and additional requirements for pig keeping under intensive conditions.

There is also a draft Australian Model Code of Practice for the Welfare of Animals - Land Transport of Pigs which is intended as a guide for people who are involved in transporting pigs. It emphasises the responsibilities of the owner of the animals (or his/her agent), drivers, attendants and railway officials. It is intended to encourage considerate treatment of animals so that transport stress and injury are minimised at all stages of the transport operation. For this Code, transport includes the period immediately before loading including any waiting periods, loading, transit, rest periods and unloading at the point of destination.

These Australian Model Codes of Practice for the Welfare of Animals are based on the knowledge and technology available at the time of publication and may need to be varied in the light of future knowledge.

These Australian Model Codes can be obtained from CSIRO Publications, PO Box 89, East Melbourne, Victoria 3002 (Tel 03 94187217, Fax 03 94194916)

#### **Destruction of Stock:**

Where sick or injured pigs have to be destroyed, the methods recommended in the Australian Model Code of Practice for the Welfare of Animals - The Pig, should be adopted.

### **8.10 Disposal of Dead Pigs and other Biological Material**

Dead pigs, immediately upon discovery, should be removed from the proximity of other pigs. Where it is impractical to dispose of the carcasses immediately they should temporarily be held in an area inaccessible to animals, vermin and birds. Disposal should be carried out in an accepted manner within 24 hour of death.

Acceptable disposal methods are:-

- (a) Removal to a disposal/rendering works;
- (b) Incineration;
- (c) Burial;
- (d) Composting.

Incineration shall conform to local fire regulations and restrictions and incinerators, if required, should conform to air - quality standards and regulations.

When burial methods are used the excavated trench or pit should be a minimum of 3000 mm above the water table. A final cover for all trenches and pits shall be 500 mm of compacted soil. The carcasses must be buried so that seepage will not issue from the pit, either surface or sub-surface, to cause spread of disease and / or pollution.

When a burial pit is in use care should be exercised to ensure that scavengers and vermin do not have access to the carcasses and that fly breeding cannot occur.

Composting of dead stock should be carried out utilising either straw or sawdust within a securely fenced compound. Care must be taken to prevent vermin build up at this site. All composting

should be undertaken on an impervious base of compacted rubble or clay. To prevent nutrients entering surface or groundwaters all clean rainfall runoff should be excluded from the site.

### **8.11 Quality Control**

The Australian pig industry is working towards the implementation of national standards for on-farm quality assurance, based on HACCP principles, and initially targeting issues of antibiotic residues and meat quality. Individual producers will increasingly be required to demonstrate their commitment to in-house quality control management procedures to ensure access to quality-assured processing facilities.

The Department for Primary Industries and Resources and private providers are available to assist pig producers with the development, implementation and audit of their quality assurance programs.

## **9. FOREIGN INVESTMENT**

The Federal Government's foreign investment policy is contained within the *Foreign Acquisitions and Takeovers Act of 1975*. The Federal Treasurer is responsible for administration of policy and is assisted by the Foreign Investment Review Board (FIRB) an advisory body to the Commonwealth Government.

A foreign interest in a corporation is taken as 15% or more ownership by an individual or foreign corporation or 40% or more where two or more individuals or foreign corporations are involved.

Agriculture and rural properties will not be examined by the FIRB when one or more of the following conditions are met:-

- the acquisition of 15% or more of a company or business valued by total assets and consideration below \$50m;
- the establishment of a new project or business with a total investment below \$50m;
- the takeover of an off-shore company with Australian subsidiaries or assets valued below \$50m and not exceeding half the global asset value.

Proposals valued at more than \$50m will be examined but are generally approved unless contrary to national interest.

As foreign investment policy is subject to alteration, updated information should be obtained by contacting: Foreign Investment Review Board, C/- The Treasury, Canberra, ACT, 2600, Australia

## 10. ACKNOWLEDGMENTS

Personnel and institutions involved in the preparation of the booklet are listed below:

The Department for Primary Industries and Resources

W. Hack	G. Schrale
K. Gent	J. Skuse
G. Pope	B. Campbell

Environment Protection Authority

C. Harris

Department of Transport, the Arts and Urban Planning

G. Butler

The Office of Local Government

G. Broughton

Murraylands Regional Development Board

S. Wright

South Australian Farmers Federation

P. Day

Pig Producers of South Australia

R. Berlin

P. Brechin

M. Moffat

I. Parish

Southern Mallee Council

M. Penhall

The following key documents were consulted:

- Guidelines for the Establishment and Operation of Cattle Feedlots in South Australia (June 1994)
- Effluent at Work (1995)
- Plan it - Build it (1994)
- Victorian Code of Practice, Piggeries (1992)
- Australian Model Code of Practice for the Welfare of Animals - The Pig
- Australian Model Code of Practice for the Welfare of Animals - Land Transport of Pigs
- Occupational Health, Safety and Welfare Regulations, 1995

Eugene McGahan, Senior Environmental Officer with the Department of Primary Industries, Queensland for his valuable input into the determination of the “Standard Pig Units Table”

Numerous other pig producers, state and local government officers for their comments and valuable advice on the document is acknowledged.

## APPENDICES

The following appendices include supporting information relevant to matters discussed in the text.

Where specific figures are shown in tables and examples it **must** be accepted that these figures are guides only as they vary greatly due to piggery design, types of effluent systems, management, nutrition regimes, pig genetics, climate etc.

Where ever such figures have been used the source of these figures have been included.

A list of the publications which were used as resource material or which provided additional information is also included.

## APPENDIX 1

### Glossary

#### Accepted standards

These are specific characteristics of the performance of the piggery related to the achievement of the objective. In most cases the standards will be in the nature of a design or operational requirement.

#### Aerobic activity

A process that requires a supply of free oxygen from the air.

#### All in - All out

A stock management system where all of one age group is held in the same air space or shed and enter and leave the system together.

#### Anaerobic activity

A process that utilises the oxygen bound in the organic material and takes place in the absence of free oxygen from the air.

#### Approved operating practices

Accepted standards may be met by using approved operating practices as set out in the guidelines or, by other means approved by the responsible authority for the development approval. The approved operating practices are in the nature of a “deemed-to-comply” provision.

#### Biological oxygen demand

Biological oxygen demand (BOD) is a measure of the amount of oxygen used by micro-organisms in the oxidation of organic matter.

#### Boar

Male pig used in the breeding herd. May also be used to describe non-castrated males of any age.

#### Bund

Watertight wall designed to contain any liquids escaping from tanks, drums or other equipment through leaks, accidental damage or incorrect operation.

#### Contamination

The release of a contaminant to the environment as a gas, odour, liquid, solid, an organism, or energy, including noise, radioactivity and electromagnetic radiation.

#### Creep Feed

High quality diet fed to piglets whilst they are suckling and as a sole feed for two weeks post-weaning.

#### Diurnally

Pertaining to each day; daily

#### Drying Lagoon

A shallow lagoon adequately sized to hold effluent for the short term purpose of evaporation of the liquid and allowing the residual solids to dry.

**Dry Sow**

A sow not lactating.

**Eco-huts**

A low-cost housing alternative where pigs (usually growers) are housed in a litter bedded shelter which is constructed upon compacted soil or concrete pad with solid walls and an arched tarpaulin-type roof.

**Effluent**

Liquors discharged after certain treatment has taken place.

**Gilt**

Female pig selected for breeding but not yet mated. May also be used to describe female pigs in the growing herd.

**Intensive Piggery**

This is an area with watering and feeding facilities where the pigs are confined within a structure designed to modify the environment for all or part of the production cycle and where the pigs are fed for the purpose of production.

The intensive piggery includes any adjoining or nearby area where:

- pigs are yarded, tended, loaded and unloaded
- the animal wastes from the piggery are accumulated or treated pending removal or disposal; and
- facilities for feeding pigs are maintained or areas where feed is stored, handled or prepared

Note: Under the Development Regulations 1993 a piggery is included in the definition for “intensive animal keeping”. (ie intensive animal keeping means the keeping or husbandry of animals in a broiler shed, chicken hatchery, feedlot, kennel, piggery, poultry battery or other like circumstances, but does not include horse keeping)

**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 from that slope. Sometimes called a drainage wind.

**Large Piggery**

This is a piggery containing greater than 5000 SPU's

**Objective**

This is a general statement of principle for the design and performance of the piggery.

**Occupier**

In relation to premises or any part of premises, the person in occupation or control of the premises whether or not that person is entitled to possession of the premises. If no person is in occupation or control, the person entitled to possession of the premises or that part of the premises is the occupier.

**Optimal Protein**

Where the protein content of the diet has been accurately matched to the pig's potential to produce lean meat.

**Percentile**

A convenient term for denoting thresholds or boundary values in frequency distributions. Thus the 10 percentile is that value which marks the lowest 10 percent of observations from the rest.

**PH**

A measure of how acidic or alkaline a product is. The pH scale ranges from 1 to 14. Less than 7 is acidic, with the acidity increasing as the number approaches 1. Greater than 7 is alkaline, and 7 is neutral.

**Phase Feeding**

The use of several growing diets which match the pig's requirements for optimal growth.

**Piggery Complex**

This includes all buildings where pigs are housed; adjoining or nearby areas where pigs are yarded, tended, loaded and unloaded; areas where animal wastes from the piggery are accumulated or treated pending removal or disposal; and facilities for feeding pigs are maintained or areas in which the feed is stored, handled or prepared.

**Pollution**

Direct or indirect alteration of the environment causing contamination or degradation.

**Pond Activity Ratio (K)**

This is a "calculated ratio" of the rate of biological activity occurring within an effluent pond as determined by specific climatic conditions. The biological activity is responsive to seasonal temperature variation and this is used in the development of the pond activity ratio (K) for different geographic locations.

**Production Systems***Farrow to Finish*

A production system where a breeding herd produces pigs which are grown out to bacon weight (approx 100kg liveweight). The growing herd will be located on the same site as the breeding herd.

*Farrow to Pork*

A production system where a breeding herd produces pigs which are grown out to pork weight (approx 60kg liveweight). The growing herd will be located on the same site as the breeding herd.

*Weaner production*

A production system where a breeding herd produces pigs which are grown out to a weight of between 14kg and 30kg liveweight.

*Grow-out*

A production system where pigs are grown from weaner weight through to pork or bacon weight.

*Multi-site*

A production system where there is a physical separation of the breeder herd, weaner pigs and grower pigs. Typically, pigs are removed from the breeder herd at between 14 and 28 days of age and transferred to the weaner facilities where they remain until they are approximately 8 weeks of age when they are transferred to the growing facilities.

The units may be on the same property separated by distances of greater than 200m or they may be located on different properties in other parts of the state or country.

**Receptor**

Person or site which receives and is sensitive to stimulating agents.

**Sow**

Female breeding pig which has been mated.

**Standard Pig Unit (SPU)**

This is based on the amount of volatile solids produced from an average size grower pig (40 kg).

**Suspended solids (SS)**

The amount of solid matter suspended in a liquid stream. A clean, clear stream has a SS of less than 10mg/L.

**Watercourse (other)**

As defined by a blue line on a 1:50000 current SA Government topographical map.

**Zoonosis**

A disease of vertebrate animals that maybe transmitted to man.

# APPENDIX 2

## Council Development Application Form

### DEVELOPMENT APPLICATION FORM

Please use BLOCK LETTERS and Black or Blue ink so that photocopies can be made of your application.

**COUNCIL:**.....

**APPLICANT:**.....

Postal Address:.....

.....

**OWNER:**.....

Postal Address:.....

.....

**BUILDER:**.....

Postal Address:.....

..... Licence No:.....

**CONTACT PERSON FOR FURTHER INFORMATION**

Name:.....

Telephone:.....(work).....(AH)

Fax.....(work).....(AH)

**EXISTING USE:**.....

<b>FOR OFFICE USE</b>				
Development No:.....				
Previous Development No:.....				
Assessment No:.....				
<input type="checkbox"/> Complying <input type="checkbox"/> Non complying <input type="checkbox"/> Notification Cat 2 <input type="checkbox"/> Notification Cat 3 <input type="checkbox"/> Referrals/Concurrences <input type="checkbox"/> DA Commission		Application forwarded to DA Commission/Council on: / / Decision ..... Type:..... Date: / /		
	<b>Decision required</b>	<b>Fees</b>	<b>Receipt No</b>	<b>Date</b>
Planning:				
Building:				
Land Division				
Additional:				
<b>Development</b>				
<b>Approval:</b>				

**DESCRIPTION OF PROPOSED DEVELOPMENT:**.....

**LOCATION OF PROPOSED DEVELOPMENT:**

House No:..... Lot No:..... Street:.....Town/Suburb.....

Section No (full/part):..... Hundred:..... Volume:..... Folio: .....

Section No (full/part):..... Hundred:..... Volume:..... Folio: .....

**LAND DIVISION:**

Site Area (m<sup>2</sup>)..... Reserve Area (m<sup>2</sup>)..... No of existing allotments:.....

Number of additional allotments (excluding road and reserve):..... Lease **YES**  **NO**

**BUILDING RULES CLASSIFICATION SOUGHT:** ..... Present classification: .....

If Class 5,6,7,8 or 9 classification is sought, state the proposed number of employees: Male:..... Female: .....

If Class 9a classification is sought, state the number of persons for whom accommodation is provided .....

If Class 9b classification is sought, state the proposed number of occupants of the various spaces at the premises:  
.....

**DOES EITHER SCHEDULE 21 OR 22 OF THE DEVELOPMENT REGULATIONS 1993 APPLY?** **YES**  **NO**

**HAS THE CONSTRUCTION INDUSTRY TRAINING FUND ACT 1993 LEVY BEEN PAID?** **YES**   
**NO**

**DEVELOPMENT COST** (do not include any fit-out costs): \$.....

I acknowledge that copies of this application and supporting documentation may be provided to interested persons in accordance with the Development Regulations 1993

**SIGNATURE** ..... Dated: / /

# APPENDIX 3

## EPA Licence Application Form

### FORM 5

Licence Application - Multiple  
Environment Protection Act, 1993, Section 36

A SEPARATE APPLICATION FORM IS TO BE COMPLETED FOR EACH SITE

Send completed application and fee to:

Senior Licensing Officer

Environment Protection Authority

Department of Environment, Heritage and Aboriginal Affairs

GPO Box 2607

Adelaide 5001 DX 228

#### OWNERSHIP/PROPERTY DETAILS

- Status of Applicant to Hold the Licence (*You must tick one of these boxes*)
  - A. **Body Corporate/Company** registered by the Australian Securities Commission  
(NB: You will have an Australian Company Number)
  - B. **Individual Person or Persons**  
(NB: You may still have a Business Trading Name under which you operate on a daily basis)
  - C. **Body created by Statute**  
(NB: Includes Local Government Councils and other Statutory Authorities)

This section to be filled in by bodies corporate (A.S.C Registered Companies) who ticked Box A above

Australian Company Number (ACN) \_\_\_\_\_

Address of Registered Office of Company \_\_\_\_\_ Postcode

- Full Name of the Applicant to hold the licence (*See note below*)  
(ie name of person or persons, A.S.C. Registered Name of Company, or Statutory Authority)

.....  
.....  
.....

Note: Licences can only be issued to a statutory authority, a company or individual persons. If several individuals operate a partnership the licence can be issued. A licence may be obtained for a small fee from Australian Securities Commission, 4th floor, 100 Pirie St, Adelaide, SA, 5000, Phone 202 8500

- Postal Address of applicant.....  
..... Postcode

- Telephone           Facsimile

- Names and positions of persons authorised to act for the business, include directors if applicable  
Name: ..... Position:.....  
Name: ..... Position:.....  
Name: ..... Position:.....  
(If more than three names and positions, please indicate in "Additional information" or on a separate sheet)

- Name and position of contact person for enquiries .....  
Telephone           Facsimile

- Trading or Business Name.....

**ACTIVITIES OF ENVIRONMENTAL SIGNIFICANCE & WASTE EMISSIONS**

8. Site Information *(See note below)*.....

Note: The E&WS Assessment Number is printed on your E&WS accounts. The details of your Certificate(s) of Title can be obtained from the Lands Title Office, 25 Pirie St, Adelaide (226 3983) or may be available in documents in your possession. eg lease, bank documents.

Site address.....

E&WS Assessment No. ....  
*(If connected to Mains Water)*

Certificate of Title Number/s .....  
*If insufficient room please include in additional information or on a separate sheet*

9. Does the applicant own the site?  Yes  No

If No, from whom is the site leased or rented?

Name: .....

Address: .....

Postcode

Telephone

10. Activities of Environmental Significance

Use Attachment 1 Part A to answer this question

<b>ACTIVITY</b>	
List the activities (except production of listed wastes) undertaken at this site	For each activity, write down how much you think you will use/produce/output/dispose of for 1996
Example entry: 5 (4) (a) or (b) Piggery	weight of production 150,000 tonnes

Do the above activities truly indicate the main businesses at the site?  Yes  No

*If No, please outline the main business*

.....  
.....  
.....

11. Discharge to the Environment:

To assist with the assessment of your application, please provide any further information regarding air, noise, solid and liquid emissions expected in the future. (eg specific noise data, volume of waste water discharge)

.....

.....

12. Production of Listed Wastes:

Use Attachment 1 Part B to answer these questions.

Does your operation produce any listed wastes at the site?

Yes

If Yes, fill in the section below

No

If No, proceed to question 13

LISTED WASTE Write down each listed waste produced by your operation	For each listed waste write down how much you think you will produce in the licensing year commencing 1 May, 1996
Example entry: asbestos	2 tonnes of asbestos

13. General information about Activities

**a. What facilities and practices are employed to reduce the potential environmental impacts associated with your operations at the site?**

(eg. pretreatment of wastewater in an anaerobic/aerobic lagoon system prior to irrigation onto land, dust suppression through use of overhead sprinklers in the area where sand is loaded onto trucks, collection and treatment of landfill gas or leachate)

.....  
 .....

**b. Do you have an environmental monitoring program or environmental management plan?**

Yes (give brief details)       No

.....  
 .....



15. a **Do you currently operate a Waste Transport Business?**

Yes

If Yes, proceed to Question 16

No

If No, proceed to Question 15 b

b **Do you plan to commence a Waste Transport Business?**

Yes

If Yes, proceed to Question 17

No

If No, proceed to Question 22

16. What types of waste do you **currently transport**?

<b>SOLID</b>		<b>LIQUID</b>
Domestic	<input type="checkbox"/>	Grease Trap/Vegetable
Green (including grass clippings)	<input type="checkbox"/>	Septic Tank Effluent
Contaminated Soil	<input type="checkbox"/>	Water/Oil mixtures
Building and Demolition	<input type="checkbox"/>	Inert Sludges/Wool Scouring Sludge
Medical	<input type="checkbox"/>	Water-Based Paint Sludges
Asbestos	<input type="checkbox"/>	Waste Oil
Other (Please specify)	<input type="checkbox"/>	Acid
.....		Alkalis
.....		Organic Solvents
.....		Other (Please specify)
		.....
		.....

17. What types of waste do you **plan to transport in the future**?

<b>SOLID</b>		<b>LIQUID</b>
Domestic	<input type="checkbox"/>	Grease Trap/Vegetable
Green (including grass clippings)	<input type="checkbox"/>	Septic Tank Effluent
Contaminated Soil	<input type="checkbox"/>	Water/Oil mixtures
Building and Demolition	<input type="checkbox"/>	Inert Sludges/Wool Scouring Sludge
Medical	<input type="checkbox"/>	Water-Based Paint Sludges
Asbestos	<input type="checkbox"/>	Waste Oil
Other (Please specify)	<input type="checkbox"/>	Acid
.....		Alkalis
.....		Organic Solvents
.....		Other (Please specify)
		.....
		.....

18. From which of the following premises do you/will you collect waste?

Tick appropriate boxes	
Individual Homes	<input type="checkbox"/>
Industrial Premises	<input type="checkbox"/>
Commercial Premises	<input type="checkbox"/>
Teaching or Research Institutions	<input type="checkbox"/>
Hospitals	<input type="checkbox"/>
Dental, Medical or Veterinary Clinics	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>
.....	

19. Do you collect waste on behalf of a Council?

- Yes  No

20. If you transport or are planning to transport listed (hazardous) waste in bulk, do the drivers involved have an authorisation from the Department of Industrial Affairs to transport dangerous substances in bulk?

- Yes  No

21. Vehicle Details

Fill in details for each vehicle used in your business for transporting waste for fee or reward

	Registration Number	Make	Body Type	Unladen Vehicle Mass (UL)
Vehicle 1				
Vehicle 2				
Vehicle 3				
Vehicle 4				
Vehicle 5				
Vehicle 6				
Vehicle 7				
Vehicle 8				

*If more than eight, please include details in "additional information" or on a separate sheet*

22. Attachments Required

*(Note that your application cannot be processed until attachments 1 & 2 are provided)*

**ATTACHMENTS**

Tick box if attached

1. **Australian Securities Commission Registered Business Extract**   
(applies only to bodies corporate)
2. **Copy of Certificate of Title/s for the site**   
(Photocopies will be accepted)
3. **Environment Protection Management Plan**   
(if available)



**OFFICE USE ONLY**

Licence Period .....  
Licence Number .....  
Fee Due .....  
Payment Received \$.....  
Date .....  
Payment Outstanding \$.....  
Date .....  
Computer Updated   
Transporter Labels Issued  
Date  
Licence Renewal .....  
Date  
Fee/Bill Renewal .....  
Date

**NOTES**

## APPENDIX 4

### Planning Approval Documentation

#### 1. Applicant & Site Information

Documentation Required	0-49	Piggery Capacity (number of standard pig units)		>5000
		50-999	1000-5000	
Name, Postal Address, Telephone, Facsimile of: 1. Applicant 2. Owner of Subject Land 3. Piggery Manager	YES	YES	YES	YES
Real Property Description of Subject Land including Hundreds, Section numbers County, Certificate of Title Folio and Volume, Local Government Authority and land area. Total farm area to be stated.	YES	YES	YES	YES
Locality Plan No. 1 Cadastral plan of vicinity (preferably 1:50,000).	NO	YES	YES	YES
Locality Plan No. 2 Topographic plan (1:50,000) showing location of all buildings, commercial and recreation facilities and clearly denoting occupancy, use and separation distances.	YES	YES	YES	YES
Locality Plan No. 3 Topographic plan showing <ul style="list-style-type: none"> <li>• location of all watercourses and drainage lines</li> <li>• limit of 1 in 100 year flood</li> <li>• environmentally sensitive sites.</li> </ul>	YES	YES	YES	YES
Locality Plan No. 4 Land Use plan showing local government zoning and land use in vicinity of the piggery.	NO	YES	YES	YES
Aerial (Survey) Photograph of Site (most recent photograph).	NO	NO	YES	YES enlargement preferred

Note: The data required in the locality plans may be shown on one plan providing that the data is clear.

## 2. Piggery Information

Documentation Required	0-49	Piggery Capacity (standard pig units)		>5000
		50-999	1000-5000	
<p><b>PROPOSAL OUTLINE</b></p> <p>documentation outlining the proposal including pig numbers and weight/type, proposed management and other relevant details.</p>	YES	YES	YES	YES
	number and type only			
<p><b>SITE PLAN</b></p> <p>showing location on subject property of piggery sheds and infrastructure, buildings, roads, drainage lines, effluent lagoons and waste utilisation areas.</p>	NO	YES	YES	YES
<p><b>PEN LAYOUT PLAN</b></p> <p>showing lay out of pens,. Pen dimensions and water/feed facilities to be shown.</p>	NO	YES	YES	YES
<p><b>EFFLUENT PLAN</b></p> <p>showing design of flushing systems, extraneous drainage exclusion system, drains, solids separation areas and anaerobic and aerobic ponds, etc. Indicate frequency of flushing in all types of sheds.</p>	YES	YES	YES	YES
	brief only			
<p><b>WASTE PLAN</b></p> <p>showing the location, area and proximity to watercourses of all land on which wastes will be utilised, estimates of quantities and types of wastes.</p>	YES	YES	YES	YES
	brief only			
<p><b>REVEGETATION PLAN</b></p> <p>showing the location and numbers of trees and shrubs to be planted around buildings, as wind breaks or visual screens. Include names of species to be planted, and numbers.</p>	NO	YES	YES	YES
<p><b>MONITORING PLAN</b></p> <p>showing how the potential impact, as applicable to the site will be measured and recorded for</p> <ul style="list-style-type: none"> <li>• surface water</li> <li>• ground water</li> <li>• soil sustainability</li> <li>• odour</li> </ul>	NO	NO	NO	YES
<p><b>TRAFFIC</b></p> <p>details of traffic volumes, routes and access to be used.</p>	YES	YES	YES &	YES &
<p><b>WATER SUPPLY</b></p> <p>documentation on source, quality and adequacy of supply .</p>			Details of licences to be included	Details of licences and annual consumption
<p><b>CARCASS DISPOSAL PLAN</b></p> <p>showing location and method of disposal of carcasses.</p>	NO	YES	YES	YES
<p><b>PIGGERY DEVELOPMENT PLAN</b></p> <p>documentation outlining the work and development schedule for the construction of the piggery and associated infrastructure.</p>	NO	YES	YES	YES

Note: The data required in the various plans may be shown on one plan providing that the data is clear.

### 3. Climatic Information

Documentation Required	0-49	Piggery Capacity (standard pig units)		>5000
		50-999	1000-5000	
Mean Annual Rainfall	YES	YES	YES	YES
Average Monthly Rainfall	NO	YES	YES	YES
Average Monthly Evaporation	NO	NO	YES	YES
Monthly Maximum and Minimum Temperatures	NO	NO	YES	YES
Wind speed and Direction Frequency by Month	NO	YES	YES	YES

Note: Data from nearest recording station. Data limitations and collection site to be indicated.

### 4. Soils & Groundwater Information

Documentation Required	0-49	Piggery Capacity (standard pig units)		>5000
		50-999	1000-5000	
<b>SOIL DESCRIPTION</b> data showing the suitability of soils for purposes intended, basic physical and chemical properties for ponds, irrigation and waste utilisation.	NO	Brief description	Detailed description including laboratory analysis	Detailed description including laboratory analysis
<b>BORE LOCATIONS</b> plan showing location, depth of and depth to SWL of all bores on the property and all relevant neighbouring properties.	NO	YES	YES	YES
<b>SPRINGS, SEEPS AND SALT SCALDS</b> plan showing location of any of these.	NO	YES	YES	YES
<b>GROUND WATER ANALYSIS</b> chemical and microbiological analysis of existing ground water.	NO	NO	YES	YES
<b>VEGETATION</b> documentation of existing vegetation and extent of proposed clearing.	NO	YES If relevant to odour impact assessment	YES If relevant to odour impact assessment	YES
<b>GEOLOGY</b> documentation of geology underlying the property.	NO	NO	YES Existing geological maps	YES Existing geological maps
<b>HYDROGEOLOGICAL ASSESSMENTS</b> detailed report assessing impacts on ground water	Site specific			

Note: The data required in the various plans may be shown on one plan providing that the data is clear.

## 5. Solid and Liquid Waste Management Information

Documentation Required	0-49	Piggery Capacity (standard pig units)		>5000
		50-999	1000-5000	
<b>SOILS CONSERVATION PLAN</b> showing location of existing and proposed soil conservation works on waste application area.	NO	NO	YES	YES
<b>DRAINAGE PLAN</b> showing drainage from waste application area and distance from watercourses.	YES	YES	YES	YES
<b>NUTRIENT AND SALT BALANCE</b> documentation showing that the size of the application area is sufficient to handle the nutrient and salts expected in the wastes, off farm disposal arrangements to be specified.	NO	YES	YES	YES
<b>SOLIDS SEPARATION SYSTEM</b> documentation showing position and method of operation.	NO	YES	YES	YES
<b>SOLIDS STOCKPILE</b> plan showing size and location of solids stockpile and runoff controls.	NO	YES	YES	YES
<b>SOLIDS SPREADING PROGRAM</b> documentation outlining method, frequency and management program for solid effluent spreading.	YES	YES	YES	YES
<b>HOLDING/EVAPORATION POND</b> documentation indicating capacity, annual runoff volumes, overflow frequency.	YES	YES	YES	YES
<b>EFFLUENT IRRIGATION WATER BALANCE</b> documentation showing that the size of the utilisation area is sufficient to handle the volume of effluent expected without runoff or seepage at flow-rates or strengths liable to cause pollution.	NO	YES	YES	YES
<b>LIQUID EFFLUENT SPREADING PROGRAM</b> documentation outlining irrigation method, frequency and management program for liquid effluent spreading.	YES briefly	YES	YES	YES

Note: The data required in the various plans may be shown on one plan providing that the data is clear.

## 6. Odour & Noise Information

Documentation Required	0-49	Piggery Capacity (standard pig units)		>5000
		50-999	1000-5000	
<b>ODOUR</b> assess generation, impact and control of odour nuisance.	YES	YES	YES	YES
<b>NOISE</b> statement outlining noise control measures considered necessary.	NO	NO	YES	YES

Note: The data required in the various plans may be shown on one plan providing that the data is clear.

## 7. Animal Welfare

Documentation Required	0-49	Piggery Capacity (standard pig units)		>5000
		50-999	1000-5000	
<b>ANIMAL CARE STATEMENT</b> statement of compliance with the Australian Model Code of Practice for the Welfare of Animals - The Pig	YES	YES	YES	YES

Note: The data required in the various plans may be shown on one plan providing that the data is clear.

## 8. Sundry Information

Documentation Required	0-49	Piggery Capacity (standard pig units)		>5000
		50-999	1000-5000	
<b>BUFFER ZONES</b> statement indicating compliance with fixed buffer zones and buffer zones applicable to the piggery, the lagoons and effluent disposal	YES	YES	YES	YES
<b>PEST CONTROL</b> outline of proposed pest control measures (rodent, birds, flies, feral animals)	YES	YES	YES	YES
<b>VISIBILITY</b> statement outlining the degree of visibility of the development by the public.	NO	NO	YES	YES
<b>ECONOMIC CONSIDERATIONS</b> employment, exports, value added, local costs and benefits.	NO	NO	YES	YES

Note: The data required in the various plans may be shown on one plan providing that the data is clear.

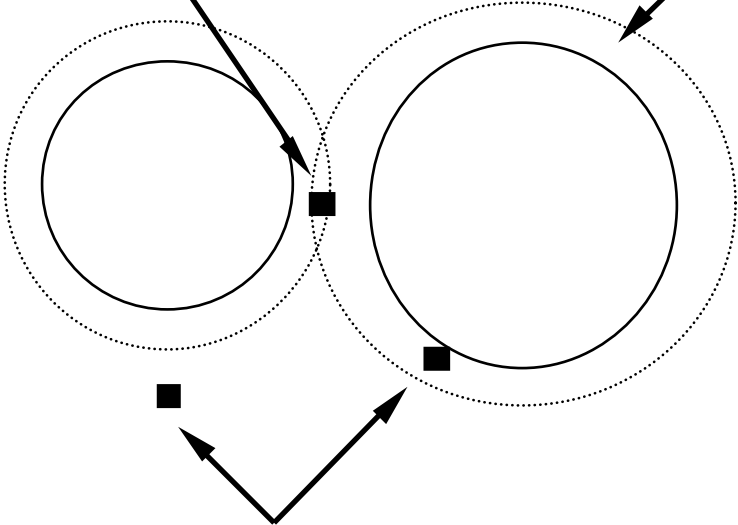
APPENDIX 5

Buffer Zones for Two Adjacent Piggeries

Two piggeries in close proximity

**Not acceptable**  
(receptor within  
overlap zone)

Additional 20%  
Separation distance



**Acceptable**  
(receptor outside the overlap zone)

## APPENDIX 6

### **Extract from Environment Protection (Industrial Noise) Policy 1994**

This Policy prescribes maximum permitted noise levels for day and night in various types of areas. For a predominantly rural area the maximum permitted noise levels are:-

7am to 10pm	47dB(A)
10pm to 7am	40dB(A)

The noise levels are generally measured at neighbouring property, or house if the house is not near the boundary.

These levels reflect the generally low level of ambient noise in rural areas.

For the purposes of this Policy the noise is “averaged” over a 15 minute period. Thus the occasional noise of a pig squealing may not be excessive while a lengthy outburst of noise such as might occur while pigs are being fed or loaded onto a truck could be above the prescribed levels.

If the noise has a pronounced tone or other disturbing component, such as a pig’s squeal, the measured level would be adjusted by the addition of 5dB before comparison with the prescribed level.

#### *Design Levels for New Piggeries*

The Policy is intended as a means of resolving noise from existing facilities; it is not a guide to good planning practice. The EPA recommends that noise from new development should not exceed 5dB above the pre existing background noise level. The background noise level should be measured as the 90th percentile (L90) and the noise in question as the 10th percentile (L10)

With good management the buffer distances in Section 7 would generally give acceptable noise levels at neighbouring houses.

## APPENDIX 7

### Monitoring Plan Guidelines

Consideration should be given to the following factors and monitoring frequency requirements when preparing an environmental management monitoring plan.

All odour complaints received must be recorded with relevant weather conditions, possible odour source, remedial action taken and any other comments relating to the complaint.

#### Recording Of Odour Complaints:

(For each complaint received or odours observed by the operator, the following can be recorded)

Date:

Time

Name of complainer

Phone number

Weather conditions:

- wind direction
- wind velocity
- temperature
- humidity: high or low

Possible odour source:

- animal houses
- lagoons
- spreading areas

Nature of complaint:

Your comments:

The following table is recommended as a guide for monitoring areas utilised for landspreading of effluent:

**Land and Water Monitoring:**

VARIABLE	Inside water protection area	Outside water protection area
	Monitoring frequency	
<p><i>Groundwater: (sampling in autumn or spring):</i></p> <p>* Total salt &amp; nitrate in all existing bores on your farm</p> <p>* Total salt &amp; nitrate in all existing bores in spreading areas</p> <p><b>In paddocks where the winter water table is less than 3m deep and salinity less than 1500 ppm drill or have special-purpose observation wells in spreading areas (1 well per 20 ha)</b></p>	<p>once per 2 years</p> <p>once per year</p> <p>twice per year</p>	<p>-</p> <p>once per year</p> <p>-</p>
<p><i>Soil nutrient status per paddock:</i> <i>(sample in autumn before sowing):</i></p> <p>pH, Salinity, Extractable P, Extractable K, Organic Carbon, Phosphorus Retention Index, Mn, Zn, S</p>	<p>each year</p>	<p>once per 2 years</p>
<p><i>Comments</i></p> <p>Give any comments/reasons why values above may be different from expected</p>		

## APPENDIX 8

### Independent Verification of Monitoring Programs

(EPA TECHNICAL BULLETIN No 21)

#### Introduction

The *Environment Protection Act 1993*, section 52(i)(a) empowers the Environment Protection Authority (EPA) to impose conditions in an environmental authorisation to require the licensee to test or monitor the environmental effects of an activity and to make specified reports to the EPA on the results of such monitoring.

The EPA may require independent verification of monitoring carried out by the licensee, to ensure that the results of such monitoring can be used confidently as a measure of environmental impacts and improvement in discharge quality.

This Technical Bulletin sets out the requirements that need to be met to comply with environmental authorisation conditions relating to the independent verification of monitoring programmes. It should also be used where the term "*independent audit of monitoring programmes*" has been used.

#### Objectives

Independent verification of monitoring programmes provides:

- assurance to the EPA that the monitoring programme meets requirements specified in conditions of licence and relevant environment protection policies;
- confidence to all stakeholders that reported results of monitoring programmes accurately reflect the impact of activities on the environment;
- confirmation for the licensee that they are complying with regulatory requirements;
- independent feedback to the licensee of ways to improve the monitoring programme and the need to modify site practices in light of the monitoring results.

#### Who conducts Independent Verification?

Verification of results of monitoring must be undertaken by a specialist who is able to make an independent professional examination of records, procedures and processes of the licensee, and give an opinion as to whether the licensee's report is accurate and whether appropriate controls and procedures have been followed.

When selecting appropriate people to conduct independent verification of monitoring programmes, licensees should take into account:

- the independence of the verifier
- membership of appropriate professional bodies
- experience in the establishment of relevant monitoring programmes
- knowledge in a relevant field of environmental science.

#### Content of the Verification Report

The following items should be included in the verification report:

1. A statutory declaration signed by the verifier that the report presents fairly the results of the verification of the monitoring programme.

2. The name of the person undertaking the verification and details of qualifications, experience and professional affiliation.
3. A statement establishing the independence of the person and their company from the licensee.
4. Statements verifying that:
  - the monitoring programme achieves the required objectives;
  - samples of monitoring were taken from required or identified sampling points by persons who can be identified for each sample;
  - all sampling equipment was in good working order;
  - sampling followed appropriate industry practice (including Australian and International Standard methods);
  - data and any logging apparatus were secure from interference;
  - analysis was consistent with professional standards (where NATA accredited laboratories are used, NATA registration details should be provided);
  - air emission testing was conducted in accordance with the document *Emission Testing Methodology for Air Pollution* available from the EPA;
  - findings of verification studies (and where appropriate, samples) were comparable with monitoring results.
5. A statement confirming compliance with the relevant conditions of authorisation or qualifying statements where there is reason to believe that monitoring was inconsistent with requirements of the authorisation (including gaps in monitoring data series).
6. Recommendations for alterations to the monitoring programme to ensure achievement of monitoring programme objectives (if they are not being achieved) and/or more efficiency in monitoring.

The independent verifier may also suggest better ways of monitoring, particularly where monitoring could be tied to process control.

Where standards exist for a particular procedure or where the people conducting sampling or analysis have current professional certification (such as NATA), the report need not describe that procedure if the report cites the standard or certification.

### **Additional Requirements**

In conducting the verification, an independent verifier must take into account not only licence condition, but also requirements for monitoring contained in relevant Environmental Protection Policies.

In cases involving marine discharge, verifiers must also comply with all requirements for independent verification, as set out in the Environment Protection (Marine) Policy 1994.

### **Further information**

ENVIRONMENT PROTECTION AUTHORITY

Department of Environment, Heritage and Aboriginal Affairs

7th Floor, 77 Grenfell Street

ADELAIDE SA 5000

Telephone: (08) 8204 2018

Fax: (08) 8204 2025

## APPENDIX 9

### Legislative Acts and Responsible Agencies

The major acts which need to be addressed for development are:-

#### Development Act 1993

The Development Act provides that any acts or activities defined as development can only be undertaken with a development approval. To develop or extend an existing piggery, a development application is required to be lodged with the relevant authority, usually the local council. Under the Development Act the approvals most likely required are:-

- a provisional Development Plan consent where the proposal is assessed with regard to its conformity and consistency with the Council's Development Plan; and
- a provisional Building Rules consent where the proposal is assessed with regard to its conformity with the technical requirements of the Building Rules by either the Council or a private certifier.

#### Further information

The local Council and / or The Department of Transport, the Arts and Urban Planning, GPO Box 1815, Adelaide 5001

#### Environment Protection Act 1993

The objects of the Environment Protection Act 1993 are to promote the principles of ecologically sustainable development and to ensure that all reasonable and practicable steps are taken to protect, restore and enhance the quality of the environment having regard to the principles of ecologically sustainable development.

Compliance with the intent of these Guidelines will assist to satisfy the general environmental duty under the Environmental Protection Act 1993. An appropriate monitoring program would demonstrate this ongoing compliance.

Piggeries are required to be licensed under the Environment Protection Act 1993 where the piggery is a prescribed activity of *Environmental Significance*. Schedule 1 to the Environment Protection Act provides that the following is a prescribed activity of environmental significance:-

Piggeries: the keeping or husbandry in confined or roofed structures of-

- (a) 5000 or more pigs at any one time; or
- (b) where the structures are situated in a water protection area (as defined for the purposes of the Water Resources Act 1990), 500 or more pigs at any one time.

The aim of licensing of piggeries is to ensure that the activity is undertaken in an environmentally sustainable manner.

An Environment Protection Policy (Water Quality) is being developed, which is expected to encourage the elimination of effluent and wastes to the water environments.

#### Environment Protection (Industrial Noise) Policy 1994

Noise emissions from existing piggeries are controlled under this policy. This Policy prescribes maximum permitted noise levels for day and night in various types of areas and is summarised in Appendix 6.

#### Further information for these two policies

Environment Protection Authority, GPO Box 2607, Adelaide 5001.

## **The Prevention of Cruelty to Animals Act, 1985**

Prevention of Cruelty to Animals Act, 1985 is an act to discourage cruelty to animals. A person who ill treats an animal shall be guilty of an offence and penalties of up to \$10,000 and twelve months imprisonment apply.

This Act also empowers the Animal Welfare Advisory Committee to examine proposed codes of practices relating to animals and report to the Minister on their likely effect upon animal welfare. It also empowers the RSPCA to enter any property where animals are held for commercial purposes.

Codes of Practices are intended as guides for all people responsible for the welfare and husbandry of animals. In the case of pigs the two main Codes of Practices are the Australian Model Code of Practice for the Welfare of Animals - The Pig and Road Transport of Livestock.

### **Further information**

Principal Animal Welfare Officer, Department of Environment, Heritage and Aboriginal Affairs, GPO Box 1047, Adelaide 5001. Codes of Practices can be obtained from CSIRO Publications, PO Box 89, East Melbourne, Victoria 3002

## **Water Resources Act 1997**

The purpose of this act is to allow the Crown to control the use of all water (watercourses, lakes, channels, underground water, run-off water - including irrigation drainage water, and wastewater). The outcome of this act is for the management of water resources to be undertaken in a manner that achieves ecologically sustainable development.

This Act replaces the Water Resources Act 1990 and the Catchment Water Management Act 1995 which were repealed on 2<sup>nd</sup> July 1997.

The Water Resources Act 1997 empowers the Minister for Department of Environment, Heritage and Aboriginal Affairs to prescribe an area's surface or groundwater (see map in Appendix 10). Under prescription, persons are required to have a water licence to take that resource.

In some prescribed areas persons can take water from a well for grazing livestock, domestic purposes, firefighting or road making, however a well construction permit is still required to drill any new well within the State. A permit will be issued on application for stock and domestic purposes or provided that the applicant holds an appropriate water licence.

A license is personal property vested in the licensee and will pass to another person under the provisions of the Act or any other law for the passing of property.

Each prescribed water area (PWA) may have a different management strategy in relation to licences. Applicants for piggery development need to determine the licensing requirements before proceeding with an application.

An important water resource, such as a stream catchment or groundwater recharge area can be protected from pollution by being proclaimed as a "Water Protection Area" pursuant to the Environment Protection Act which limits the range of activities and uses within that area. Generally licences will not be issued for piggeries within these areas (Appendix 10).

Other legislation which protects the State's water resources includes:-

- The Environment Protection Act that controls water quality (included in this section);
- The Local Government Act 1934 pertains to the management of water courses and flood control, septic tanks and land activities that affect water resources. The provisions in this Act relating to watercourse management will be repealed in 18 months to two years;

- The Murray - Darling Basin Act 1993 pertains to the flow, use, control and quality of water in the River Murray and is administered by the Murray Darling Commission. Under this Act piggeries are prohibited in the flood zone (corresponds with the 1956 flood plain) and the fringe zone (within 100 metres of the water edge);
- The Groundwater (Border Agreement) Act 1985 allows the cooperative management of the groundwater resources in a 20 km wide strip of land each side of South Australian - Victorian border.

**Further information**

Department of Environment, Heritage and Aboriginal Affairs, GPO Box 1047, Adelaide 5001

**Other relevant acts to be considered when establishing and operating a piggery are:-**

**Native Vegetation Act**

This act controls the clearance of native vegetation and prior approval is required before any clearing occurs.

**Further information**

Department of Environment, Heritage and Aboriginal Affairs, GPO Box 1047, Adelaide 5001.

**Stock Medicines Act**

Registration is required for a large range of veterinary medicines and treatments. Registration is a Commonwealth responsibility and is carried out by the National Registration Authority (NRA) while the States and Territories are responsible for control of use. In South Australia veterinary chemicals, vaccines, antibiotics and feed supplements containing drugs are required to be used as instructed or under veterinary supervision.

**Further information**

Department for Primary Industries and Resources, GPO Box 1671, Adelaide 5001

**The Aboriginal Heritage Act**

This Act provides for the protection and preservation of the Aboriginal heritage. Land containing Aboriginal sites, objects or remains cannot be developed without appropriate approval.

**Further information**

Department of Environment, Heritage and Aboriginal Affairs, GPO Box 3140, Adelaide 5001.

**The Branding of Pigs Act 1964**

This act is presently being reviewed and will become part of the new Livestock Act.

The act requires that all pig owners must brand their pigs with a registered brand prior to sale. This requirement to brand pigs prior to sale is uniform across all states. This act was introduced as an aid to disease control by enabling traceback to the property of origin following slaughter.

All pigs must be branded within seven days before sale or offer for sale. The only exceptions are pigs less than 20kg in weight and those that were branded correctly and resold within seven days.

**Further information**

Department for Primary Industries and Resources, GPO Box 1671, Adelaide 5001

### **The Local Government Act 1934**

This act restricts the keeping or breeding of pigs within a township or municipality or an area within 100 metres of the borders of a township.

#### **Further information**

Local Council and or Local Government Association of SA, GPO Box 2693, Adelaide 5001.

### **The Stock Act 1990**

This act is presently under review and will be consolidated into the new Livestock Act.

The Stock Act sets up the legislative framework for the control of infectious and contagious diseases, contaminants, chemical and antibiotic residues and some husbandry practices such as swill feeding and grazing stock on effluent-irrigated land.

#### **Further information**

Department for Primary Industries and Resources, GPO Box 1671, Adelaide 5001

### **The Swine Compensation Act 1939-72**

This act is presently under review and will be consolidated into the new Livestock Act.

The purpose of the swine compensation act is to reimburse owners' of pigs that died, condemned at slaughter or were slaughtered to aid in the detection of certain infectious diseases. The infectious diseases for which compensation is payable are:-

- Infectious Pneumonia
- Infectious Rhinitis
- Salmonellosis
- Tuberculosis

#### **Further information**

Department for Primary Industries and Resources, GPO Box 1671, Adelaide 5001

**Other agencies names and addresses** which may provide information on associated permits and licences can be sourced through "The Business Centre," 145 South Tce, Adelaide SA 5000.

## APPENDIX 10

### Water Protection and Prescribed Wells Areas in South Australia

#### **Water Protection Areas**

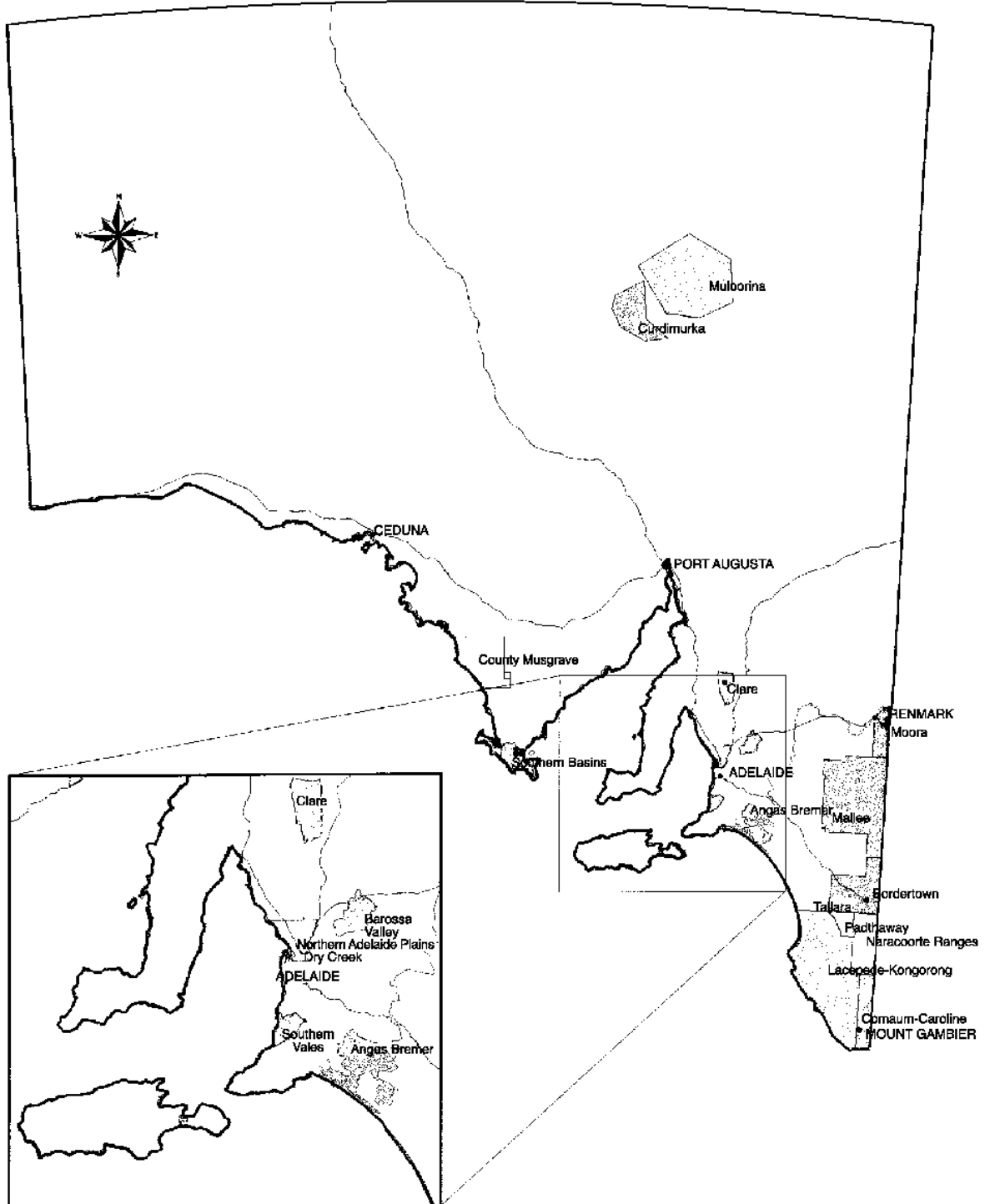
1. Baroota (Mid-North)
2. Beetaloo (Mid-North)
3. Carribie (Yorke Peninsula)
4. Eyre Peninsula Southern Basins
5. Kappawanta and Bramfield (Eyre Peninsula)
6. Marion Bay (Yorke Peninsula)
7. Middle River (Kangaroo Island)
8. Mount Lofty Ranges
9. Never Never Creek (Mid-North)
10. North Para River (Central)
11. North West River (Kangaroo Island)
12. Para Wurlie (Yorke Peninsula)
13. Penong (Eyre Peninsula)
14. Polda Basin (Eyre Peninsula)
15. Port Kenny (Eyre Peninsula)
16. River Murray
17. Robinson Basin (Eyre Peninsula)
18. Sheringa (Eyre Peninsula)
19. South East
20. Spring Creek (Mid-North)
21. Talia (Eyre Peninsula)
22. Thulinippie (Eyre Peninsula)
23. Tod River (Eyre Peninsula)
24. Tookayerta Creek (Central)
25. Venus Bay (Eyre Peninsula)



## **Prescribed Wells Areas, Prescribed Surface Water Areas, and Prescribed Watercourses**

1. Curdimurka Prescribed Wells Area (located in the far north)
2. Muloorina Prescribed Wells Area (located in the far north)
3. County Musgrave Prescribed Wells Area (located on Eyre Peninsula)
4. Southern Valley Prescribed Wells and Surface Water Area
5. Clare Valley Prescribed Wells and Surface Water Area
6. Barossa Valley Prescribed Wells and Surface Water Area
7. Northern Adelaide Plains Prescribed Wells Area
8. Bolivar Prescribed Watercourse
9. Dry Creek Prescribed Wells Area
10. Chapman's Creek Intake Prescribed Watercourse (located adjacent to the Northern Adelaide Plains Prescribed Wells Area)
11. Middle Beach Intake Prescribed Watercourse (located adjacent to the Northern Adelaide Plains Prescribed Wells Area)
12. Northern Intake Prescribed Watercourse (located adjacent to the Northern Adelaide Plains Prescribed Wells Area)
13. Southern Vales Prescribed Wells Area
14. River Murray Prescribed Watercourse
15. Mallee Prescribed Wells Area
16. Noora Prescribed Wells Area
17. Angas Bremer Prescribed Wells Area
18. Tatiara Prescribed Wells Area (located in the South East)
19. Padthaway Prescribed Wells Area (located in the South East)
20. Naracoorte Ranges Prescribed Wells Area (located in the South East)
21. Comaum-Caroline Prescribed Wells Area (located in the South East)
22. Lacepede-Kongorong Prescribed Wells Area (located in the South East)

## Prescribed Areas and Watercourses in South Australia



## APPENDIX 11

### Water and Accommodation Guidelines

#### Water

Water usage varies according to environmental temperature, liveweight and piggery drinking systems.

The following table is a guide for the typical summer drinking requirements of pigs.

#### Typical summer drinking requirements of pigs:

Class of Stock	Liveweight (kg)	Litres per day
Dry Sow		12 - 15
Lactating Sow and Litter		25 - 45
Weaners	25 kg	3 - 5
Growers	45 kg	5 - 7
Growers	65 kg	7 - 9
Over	90 kg	9 - 12

*\*Sourced from the Australian Model Code of Practice for the Welfare of Animals - The Pig*

#### Accommodation

When allocating space requirements consideration must be given to group size, pen size, age, breed, temperature, ventilation, lighting and other animal husbandry factors. Suggested minimum space allowances for housed pigs based on current techniques are shown in the following table.

#### Maximum recommended stocking densities for housed pigs

System	Minimum Space Allowance (m <sup>2</sup> per pig)	Comments
up to 10 kg	0.11	
11 - 20 kg	0.18	approx. 20 - 30 percent
21 - 40 kg	0.32	of space allowance provides
41 - 60 kg	0.44	for a dunging area
61 - 80 kg	0.56	
81 - 100 kg	0.65	
adult pigs in groups	1.4	
adult pigs in individual stalls	0.6 x 1.8 m	
boars in pens used for mating	6.25	minimum length of shortest side 2 m
lactating sows in:		with piglets up to 4 wks of age
stalls	3.2	
individual pens	5.6	
multisuckling groups	5.6	for each sow and litter

*\* Sourced from Australian Model Code of Practice for the Welfare of Animals - The Pig*

Recent research has shown that it is important to improve air quality in the environment in which the pigs are raised. Based on the outcomes from this research the following table illustrates recommended airspace volume for different classes of pigs housed with natural ventilation.

**Stocking densities for growing pigs with natural ventilation**

<b>Class of pig</b>	<b>Volume airspace per pig</b>
Weaners to 24kg	1.8 cubic metres
Growers to 50kg	2.3 cubic metres
Growers to 102kg	3.0 cubic metres

*\* Sourced from The Good Health Guide Manual, Pork Research and Development Corporation, 1995*

## APPENDIX 12

### Land Disposal of Effluent Guidelines

#### Land Spreading Calculations

The following two examples illustrate how to calculate effluent disposal area when land spreading effluent. These samples are *hypothetical* and should be used as a framework into which specific data from the actual operation should be used.

#### Standard Assumptions:

##### (1) Kilograms of nutrients removed by wheat or legume hay at three localities:

	yield (t/ha)	N kg/ha/yr	P kg/ha/yr	K kg/ha/yr
<b>Bordertown</b>				
Wheat Requirements	4	23 x 4=92	3 x 4=12	5 x 4=20
Legume Hay	12	25 x 12=300	2.5 x 12=30	25 x 12=300
<b>Murray Bridge</b>				
Wheat Requirements	1.5	23 x 1.5=34.5	3 x 1.5=4.5	5 x 1.5=7.5
Legume Hay	5	25 x 5=125	2.5 x 5=12.5	25 x 5=125
<b>Mallalla</b>				
Wheat Requirements	2	23 x 2=46	3 x 2=6	5 x 2=10
Legume Hay	6	25 x 6=150	2.5 x 6=15	25 x 6=150

*\*Nutrient removal rate per tonne grain/hay sourced from Schultz J.E. and French R.J (1978) Australian Journal Experimental Agriculture & Animal Husbandry.*

#### Example 1: Application rate per hectare where the nutrient loads in the lagoon are known.

##### (1) Analysis of effluent in anaerobic pond:

Nutrient	Concentration
Nitrogen	2175 mg/l or 2.175kg/kL
Phosphorus	850 mg/l or 0.85 kg/kL
Potassium	1618 mg/l or 1.618 kg/kL

*\* Assumed average pond concentrations*

*\* NB There is a large variation in concentrations between piggeries due to management, nutrition, genetics etc. and therefore it is recommended that analysis should be carried out at each site.*

**(2) Available nutrients to the crop in year of application**

(assume 50% of total N, 70% of total P and 90% of total K)

Available total N =  $0.5 \times 2.175 = 1.087\text{kg/kL}$

Available total P =  $0.7 \times 0.85 = 0.595\text{kg/kL}$

Available total K =  $0.9 \times 1.618 = 1.456\text{kg/kL}$

**(3) Application rate per hectare to meet crop requirements**

	N	P	K
	kl/ha	kl/ha	kl/ha
Bordertown			
Wheat	$92 \div 1.087=85$	$12 \div 0.595=20$	$20 \div 1.456=14$
Hay	$300 \div 1.087=276$	$30 \div 0.595=50$	$300 \div 1.456=206$
Murray Bridge			
Wheat	$34 \div 1.087=31$	$4.5 \div 0.595=8$	$7.5 \div 1.456=5$
Hay	$125 \div 1.087=115$	$12.5 \div 0.595=21$	$125 \div 1.456=86$
Mallalla			
Wheat	$46 \div 1.087=42$	$6 \div 0.595=10$	$10 \div 1.456=7$
Hay	$150 \div 1.087=138$	$15 \div 0.595=25$	$150 \div 1.456=103$

Select the lowest application rate and then adjust the required level of the other two nutrients with a chemical fertiliser.

**Example 2: Calculation for determining land area required for spreading fresh manure:**

**(1) Piggery size**

- 100 sow farrow to bacon piggery

**(2) Typical fresh manure production from a proposed piggery:**

Nutrient	Production
Nitrogen	21.7 kg/day
Phosphorus	7.3 kg/day
Potassium	12.1 kg/day

*\*Data sourced from Kruger, Taylor, Ferrier (1995). Effluent at Work*

### (3) Available nutrients:

- assume loss of 30% of total N, 10% of total P, 10% of total K in shed and sump.
- assume plant availability in year of application 50% of total N, 70% of total P and 90% of total K.

Available total N =  $0.7 \times 0.5 \times 21.7 \times 365 = 2772$  kg/year

Available total P =  $0.9 \times 0.7 \times 7.3 \times 365 = 1679$  kg/year

Available total K =  $0.9 \times 0.9 \times 12.1 \times 365 = 3577$  kg/year

### (4) Land area required for spreading

Calculation: available nutrient kg/yr ÷ nutrient requirement kg/ha/yr = area (ha)

	N	P	K
	ha	ha	ha
Bordertown			
Wheat	$2772 \div 92=30$	$1679 \div 12=140$	$3577 \div 20=179$
Hay	$2772 \div 300=9$	$1679 \div 30=56$	$3577 \div 300=12$
Murray Bridge			
Wheat	$2772 \div 34.5=80$	$1679 \div 4.5=373$	$3577 \div 7.5=477$
Hay	$2772 \div 125=22$	$1679 \div 12.5=134$	$3577 \div 125=29$
Mallalla			
Wheat	$2772 \div 46=60$	$1679 \div 6=280$	$3577 \div 10=358$
Hay	$2772 \div 150=18$	$1679 \div 15=112$	$3577 \div 150=24$

Select the largest land area required and adjust the deficits of the other two nutrients with a chemical fertiliser.

### Comments:

These calculations are ways of estimating the land area required under these crop rotations if the soil nutrient level is to be maintained at its present level. In the majority of SA soils a build up of phosphorus and nitrogen levels would be desirable and therefore the amount of effluent spread per hectare could be initially higher than those used in these examples. Contact should be made with a Department for Primary Industries and Resources agronomist or fertiliser company representative to determine what are the suitable nutrient levels for individual soil types and localities.

The nutrient levels in liquid removed from anaerobic ponds is much less than those in fresh manure due to the chemical and biological reactions that take place in the sludge and supernatant within the pond. Also considerable amounts of nitrogen are lost through volatilisation from the ponds.

It is for these reasons that the size of the land area required for spreading effluent from ponds is much less than that required for spreading fresh manure collected in a shed sump.

## APPENDIX 13

### References and Resource List

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## APPENDIX 14

### General Hygiene Procedures for Piggery Staff

When working with animals there is always a risk of infections passing from animals to people.

Pig producers have a duty of care to their staff to insist on best practice Occupational Health and Safety. A few simple hygiene and safety procedures will greatly reduce the risk. Most of these are common sense and apply in every day life.

The risk of infection is mainly spread by contact of infected fluids with cuts/abrasions or via the mouth and eyes.

#### General

- Wash your hands with soap and water, preferably warm water, prior to handling food, eating, drinking, smoking or chewing gum.
- All cuts and scratches should be cleaned, disinfected and covered with water proof dressing. Wear appropriate gloves if old cuts are present or are healing.
- Wear appropriate gloves and protective clothing when handling afterbirth, dead pigs or performing any procedure which risks putting you in contact with body tissues or fluids.

#### Farrowing Shed

When assisting sows to farrow or removing afterbirth from a sow:

- Clean around the vulva/rump area with soapy water;
- Scrub and disinfect your arm. Wear shoulder length gloves;
- Use plenty of lubricant to avoid injury to the birth canal;
- Upon completion, treat the sow with antibiotics to prevent infection;
- While still using gloves, remove afterbirth from crate and dispose of it;
- Discard gloves hygienically;
- Keep clear of urine splashes;
- Wash hands with soap or disinfectant after completing the examination;
- Splash proof goggles would minimise the risk of eye infection.

#### Performing Post-Mortems

If the pig has died from an infection then bacteria can be at very high levels in the body. Particular care must be taken when performing post-mortems due to the risk of cuts and splashes occurring.

- Always wear a pair of thick gloves\* (kitchen gloves are suitable);
- Don't eat or smoke until you have finished and cleaned up;
- Don't open the kidneys, or urinary bladder unless you specifically suspect a urinary tract infection;
- Protect any cuts on the hands with a water proof dressing before you start;
- Treat any new cuts immediately - not when you finished;
- Work slowly and carefully and don't splash fluids around;

- Wash your hands with soap or disinfectant after completing the examination;
- Use splash proof goggles or visor.

### **Mating Shed**

- Use appropriate gloves when assisting in mating;
- Cover all cuts before handling pigs;
- Wash your hands with soap or disinfectant before smoking or consuming food.

### **Treatment of Animals**

When injecting animals minimise the risk of needling yourself by:

- Reducing the movement of the pig when injecting the treatment;
- Using sharp needles and discarding those that are blunt;
- Regularly change syringes;
- Taking care when filling syringes from bottles or plastic packs;
- Dispose of needles in “sharps” containers;
- Do not leave syringes and needles lying around.
- Immediately wash and disinfect any needle injuries and seek medical treatment if necessary.

Note: Natural rubber gloves can cause an allergic reaction in some users. Try to avoid gloves made of natural rubber if possible.