Appendix IV: Good management practices for intensive pig farming

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This appendix has been included in the Plan for general public information and education purposes. The information contained in this appendix also provides guidance on the best practicable options for preventing or minimising adverse effects on the environment from emissions to air from pig farming. It also provides a general indication of the matters that the regional council may consider and the nature of the conditions that might be attached to a resource consent for the discharge of contaminants into the air from piggeries (refer rules 47 to 50).

Applicants and resource consent holders will also be expected to demonstrate that they are giving effect to 'EnviroPork™ (2005)' and the Environmental Management System, both prepared by the New Zealand Pork Industry Board (www.pork.co.nz). The Council may also give consideration to 'Odour Management at Intensive Livestock Installations' published by the UK Environment Agency 2005, (www.environment-agency.gov.uk/ agriculture, then select 'pigs and poultry'), and 'Code of Practice: Piggeries 1992', Department of Primary Industries (Victoria, Australia) (www.dpi.vic.gov.au, then select 'agriculture and food', then 'animals and livestock' then 'pigs').

The material presented in this appendix must not be considered as a set of rules that will be applied universally. Each individual situation will be considered by the Taranaki Regional Council on its particular merits and circumstances, with regard for the level of environmental protection that is appropriate in that situation.

Before starting a new pig farm, or extending an existing operation, it is strongly advised that the proposal should be discussed with staff of the Taranaki Regional Council as well as with the local district council and the neighbours of the site.

Best practicable option – piggery emissions

(a) Application of buffer distances

Preferred minimum buffer distances are set out in Tables 1 to 3 (page 160). It should be noted that buffer separation is not a substitute for good management of sheds, nor will observation of these distances without consideration of other factors ensure no odour problems off site.

The buffer distances set out in this Appendix do not represent the minimum distances required before a resource consent will be considered. However, should a piggery be unable to meet the stipulated buffer distances, greater account will be taken of any concerns expressed by neighbours and more emphasis placed upon means of abating odorous emissions.

The Taranaki Regional Council will have regard to these buffer distances in determining whether notification of resource consent applications is required, and in determining the extent of any mitigation requirements. If these buffer distances cannot be met, it does not mean that resource consents will automatically be declined.

Future expansion

Applicants should consider whether their proposed site is capable of supporting an expansion without increasing off site effects to adjacent neighbouring properties, even if this is not immediately planned. The granting of a consent for a particular size of operation does not guarantee a consent can be changed to accommodate an expanded activity at some time in the future.

1. Buffer distances must be considered separately for:
    - the piggery itself (refer Rules 47 to 50);
    - effluent holding and treatment systems (refer Rules 40 and 55); and
    - effluent disposal areas (refer Rules 35 and 55).
2. Distance from the perimeter of a piggery[48], or from the nearest point of an effluent holding and treatment system:
    - to any property boundary: 20 metres.
    - to any public amenity area or road: 50 metres.
3. Distance from the edge of any deposition zone used for effluent or manure spreading:
    - to any property boundary: 20 metres.
    - to any public amenity area or road: 50 metres
4. Standard and variable buffer distances

Standard buffer distances are set out in Table 1 (page 160). These distances may be varied as outlined in: section (a) 5 '*Reduction in variable buffer zone dimensions (distances) for a piggery*' (page 160).

[48] The '**piggery perimeter**' is defined as a line circumscribing the extremities of an intensive piggery, containing all pig housing and animal enclosures.

Table 1: Standard buffer distances (note: the NZ Pork EMS provides individual buffer distances calculated on site-specific criteria)

p-value	Distance from perimeter to:-		
	1. Nearest community (10 houses or more) metres	2. Any place of public assembly metres	3. Any off site dwellinghouse metres
25 to 500	450	300	200
501 to 1999	900	650	250
2000 - 2499	1250	1000	300
2500 - 2999	1500	1200	400
3000 - 3499	1750	1400	450
3500 - 3999	2000	1600	500
4000 - 4499	2250	1800	550
above 4500	2500	2000	600

P value – means the maximum number of pigs kept in a piggery. For a weaner producer piggery, the p value will be taken as five times the number of pigs on the premises that are aged 71 days or more, or that weigh more than 25 kg. A weaner producer piggery means a piggery in which the progeny of breeding animals are removed prior to attaining either 25 kg in weight or 70 days in age (whichever occurs first).

5. Reduction in variable buffer zone dimensions (distances) for a piggery

- a buffer zone dimension may be reduced only when the piggery achieves and maintains conditions of a higher air quality and efficiency compared with those prescribed for a standard piggery.
- the maximum reduction will be regarded generally as a 40% reduction in the distances given in Table 1 above, ie: 0.6 multiplied by the standard buffer distance.

Table 2: Buffer distances for effluent holding and treatment located outside the piggery perimeter [49] (note: the NZ Pork EMS provides individual buffer distances calculated on site-specific criteria)

Effluent holding and treatment system	Nearest community (10 or more houses)	Any place of public assembly	Any off site dwellinghouse
Anaerobic pond only	1000	500	250
Facultative lagoon system (aerobic surface layer)	750	400	200
Multiple pond system with aerobic final ponds	500	200	150

Table 3: Buffer distance for land application activities - These distances are measured from the edge of deposition areas. (note: the NZ Pork EMS provides individual buffer distances calculated on site-specific criteria)

Effluent application	Nearest community (10 or more houses)	Any place of public assembly	Any off site dwellinghouse
Sprayed into air more than 2 m above ground. Liquid ponds on surface for more than 3 hours. Solids not ploughed into soil. Anaerobic effluent.	1000	500	250
Anaerobic effluent applied by surface pipes or from mobile systems directed downwards. Liquids absorbed into surface within 3 hours. Solids ploughed into soil.	700	400	200
Fresh effluent (less than 12 hours old) after solids separation, or secondary pond effluent (BOD less than 2500 g/m^3).	500	200	150

[49] The '**piggery perimeter**' is defined as a line circumscribing the extremities of an intensive piggery, containing all pig housing and animal enclosures.

(b) Environmental Management Plan

Applicants and operators should prepare an Environmental Management Plan (EMP) that describes measures for minimising environmental risks and contingency actions for responding to problems. The EMP should cover:

- a list of all key risk events for odour;
- a list of all key risk events for dust;
- waste management issues;
- the day-to-day best management practices and responses that will be put in place on the site to avoid or reduce these events and issues;
- details of contingency plans, describing actions, allocating responsibilities, and providing contact details for any outside advice, notification or assistance that might be required;
- details of any self-monitoring that will be carried out, including property boundary odour surveys;
- familiarisation of all staff with consent conditions and the contents of the EMP;
- trigger events and target response times;
- procedures for corrective actions taken as a result of an owner's own identification of any issue; and
- procedures for addressing complaints and incidents.

Readers should in particular refer to the Environmental Management System (EMS) of the New Zealand Pork Industry Board (note that not all information or requirements set out in this reference are applicable in Taranaki).

Operators should seek to ensure that they incorporate the best practicable options currently available for reducing emissions regardless of whether their operations meet the recommended buffer distances set out above.

The EMP should be updated every five years (at a minimum).

(c) Prevailing winds

If sensitive land uses (refer policy 2.3 of the Plan) are located downwind under prevailing wind directions, the preferred buffer distances above may be increased by 50%. Prevailing wind directions are generally as follows -

North Taranaki: from south-east, west and north-east
Central Taranaki: north and south
South Taranaki: from west and south-east

Local micro-climates may be different to these. For advice on particular localities, operators should check with the Taranaki Regional Council. Consent applicants will be expected to have obtained information on local wind directions.

(d) Meteorology

Some parts of Taranaki are more prone than others to atmospheric conditions that trap emissions and prevent them dispersing. Operators should seek advice from the Taranaki Regional Council when considering both a general locality and a specific site for their facilities.

(e) Shed configuration

The preferred shed configuration is:-

- across the direction of prevailing winds, rather than parallel to them; and
- with multiple emission points, rather than a single discharge source (but see below re: 'discharge point design').

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Shed lay-out should be such that doors are at the end of the sheds furtherest from neighbours.

It is acknowledged that other site-specific considerations will also have to apply, such as:

1. the avoidance of conflict between air discharge points and neighbouring dwellings
2. land contours
3. orientation to the sun.

(f) Discharge point design

Dispersion of discharges is enhanced by:-

- increasing the height of discharge points;
- avoiding the use of conical rain shields over discharge stacks;
- changing from side-wall ventilation to overhead ventilation;
- changing from lowline roof ventilation exit points, to raised (ducted) ventilation points elevated well above the roof line (at least 3 metres above the roof line, to be fully effective);
- changing from natural ventilation air flows to fan-assisted ventilation;
- increasing vertical gas flow velocities by appropriate fan speeds, fan sizes and ducting diameters.

Notes and comments

Conical rain shields deflect discharge flows downwards rather than upwards. They should therefore be avoided.

Ideally, the point of discharge from the stack during ducting should be at least 3 metres above the peak roof line of adjacent buildings, to avoid downdraughts and eddies and to promote dilution.

(g) Shed construction

Sheds should be constructed in a manner that makes them free of draughts and leaks, and subsequently well maintained. Materials should be impervious, to assist in cleaning and to avoid absorption of odours. Horizontal surfaces (other than the floor) will tend to accumulate dust and other wastes, and should be avoided. Flooring must be impervious and easily cleaned and disinfected.

Ventilation systems should not allow rain to enter the building and dampen litter.

Notes and comments

The need to eliminate draughts as a means of reducing air emissions is self-evident. Wet litter has been shown to result in increased odour release.

(h) Topography

Sheds should not be sited within the same valley system as sensitive receiving environments, unless the site is both downslope, and downwind under all prevailing wind directions. Sheds should not be sited on slopes above sensitive receiving environments.

Notes and comments

Valleys tend to channel emissions, preventing dispersion. Katabatic drift (the movement of air at night as it cools down) tends to flow down slopes, and can carry long distances.

(i) Aprons and access roading

These should be constructed of impervious material, and large enough to allow clean out of shed litter and loading for transport off site, without litter falling onto soil, surrounding gravel surfaces, or into any water or drainage channels. Roading and access should be kerbed to direct dirty water to collection tanks.

(j) Moisture control of litter

The moisture content of litter should be controlled by:

- prompt repair of leaks in roof and exterior walls;
- prompt repair of leaks in drinking water piping and drinkers;
- an adequate depth of bedding litter;
- the removal of damp litter around drinkers;
- adjustment of fogging spray systems, if used, so that droplets do not fall onto litter.

A moisture content of 30-40% is optimal, avoiding dust (too dry) and odour (too damp). If litter is caking or sticky, it is too wet.

Notes and comments

Wet litter is a significant odour source, especially as manure accumulates.

(k) Screening

Tree planting that screens buildings from neighbours or other sensitive receiving environments should be undertaken and maintained. While there is no clear evidence that vegetation reduces odour, it will disturb air flow (enhance mixing and thus dilution), and by reducing awareness of an activity will reduce sensitivity. Planting should be high and dense enough to screen buildings from sight of neighbours. Earthen embankments or fences may also be used.

At the same time, planting encroaching around the buildings will prevent free air flow around them, and should be avoided. A minimum separation of 20 metres is advised. Similarly, parallel pig sheds should be separated by a distance of at least five times the height of the buildings.

Notes and comments

If an odour source is not visible, then awareness of it decreases and people are less conscious of the odour. In addition, trees increase air turbulence (and therefore mixing and dispersion), remove odours from air flows (although this effect will be minor in most cases), and remove dust from air flows.

(l) Offal holes

Refer Rule 35 of the Plan. A sealed and lined offal hole will promote anaerobic decomposition and is generally favoured for small numbers of mortality, subject to avoiding an accumulation of methane gas (explosive and suffocating).

(m) Litter or manure removal

Faeces, urine, food wastes, and other biological material should be removed from the confines of the buildings preferably in less than 12 hours, and in no case more than 30 hours. As far as practicable, wind speed and direction should be taken into account when removing litter, and timed for periods when wind speed and direction are less likely to carry odour and dust towards neighbouring residences.

(n) Litter or manure spillage

Litter spillages (e.g. during its removal from sheds or from the property) should be recovered as soon as completely as practicable, and particularly before becoming damp.

(o) Litter or manure stockpiles

If used litter is stockpiled on the property (whether prior to removal, or for treatment or for ultimate use on the property), then it should be substantially covered by tarpaulins, sheeting or similar, or in a draught-proof building with closed doors, if the pile is within 150 metres of any residential property off the site, or within 200 metres of any dwellinghouse off the site.

(p) Litter or manure spreading onto land

Research indicates that most volatile compounds (including ammonia) are released within 4 hours of spreading on land (although significant releases may continue for several days). Spreading prior to 2 pm therefore generally avoids evening atmospheric inversion conditions, and the period of day when people may be relaxing outside. Experience is that untreated (anaerobic) slurry will release odour at significant rates for 6 hours.

Accordingly, measures that might assist to reduce odour effects include that wastewater land irrigation of aerobic pond effluent on any day between the last Sunday in September and the first Sunday in April should be undertaken prior to 2.00 pm (daylight saving time). If effluent from shed wastes or an anaerobic pond is spread or sprayed onto land, it should be undertaken before 12 noon. As far as practicable and taking into account operational requirements, avoid spreading on weekends and public holidays.

Records should be kept of dates, locations, quantities, and weather conditions prevailing when wastes are spread. As far as practicable, spread wastes only when the wind is away from neighbours, roads and sensitive receiving environments.

Liquid should not be spread at such a rate that it remains ponded on the surface for more than one hour after spreading.

(q) Complaints

Any complaints concerning odour, or other effects of discharges to air, received by a farm operator should be recorded in writing by the operator. Details should include:

- the time, nature and extent of the effect as reported, including its duration, frequency and offensiveness;
- the location, name and contact phone number of the complainant (if known);
- the wind direction and speed at the time of the incident;
- general weather conditions (e.g. humid, fine and clear, misty);
- general operational status of the farm;
- any on-farm circumstances that may be related to the incident;
- any investigations undertaken as a result of the complaint;
- any changes made to farm activities as a result of the incident;
- any report given back to the complainant.

(r) Emission abatement technology - dust

Dust mitigation measures include:

- control of dust content of supplied litter;
- misting sprays within sheds;
- avoiding over-dry litter;
- minimising animal movement and activity;
- maintaining a vegetation cover on areas around buildings;
- avoiding high air flow velocities inside sheds;
- using dust filters on extraction ducting;
- adequate separation from neighbouring properties/premises;
- tree screening;
- avoiding dusty feedstocks;
- controlling vehicle speeds on dirt access tracks.

(s) Emission abatement technology - odours

Odour mitigation measures include:

- an adequate depth of litter in the shed;
- a high standard of building and floor cleanliness;
- clean animals;
- proper stocking rates;
- misting sprays within sheds;
- avoiding over-damp litter;
- proprietary odour treatment systems;
- adequate separation from neighbouring properties/premises;
- elevated discharge into the air from buildings;
- passing odorous air through biofilters or chemical scrubbers;

- controlling interior shed temperature below 26°C;
- tree screening;
- the correct sizing of wastewater systems, including allowance for expansion of pig numbers.

Notes and comments

It should be noted that proprietary odour treatment systems should be tested for demonstrated performance and cost-effectiveness before purchase and use.

(t) Burning of wastes and rubbish

Further to matters related to burning covered elsewhere in the Plan, or by a resource consent, the burning of wastes is not generally favoured because of the likelihood of smoke and odour nuisance.

(u) Wastewater collection systems - design and operation

Washdown and wastewater collection and transport systems should be designed and constructed so as to avoid stagnation of wastewaters. Low points in the system should be avoided and gradients should be calculated to avoid sedimentation or settling of solid wastes within channels. Enclosed pipes rather than open channels are preferred, including for transfer to outside buildings. Site drainage should prevent stormwater ingress into sheds and contamination of stormwater systems by litter or washwater runoff.

If odours do occur, the cleaning and flushing of pen floors and drainage channels and pipes should be increased in frequency, from every second day, to every second day at regular times, to daily, or to morning and evening, as the need arises. Cleaning should include the removal of all feed not consumed within 24 hours, and all solid and liquid wastes. Washing in summer should be more frequent than in winter. Other than for waste reception channels or trenches, effluent transfer lines should be enclosed pipes whenever practicable.

Wastewater holding tanks, pump wetwells or sumps should be covered or enclosed, to minimise odour release. Sediment in sumps should be removed at no longer than three-monthly intervals.

Note: this section addresses only air emission effects from wastewater. Water quality impacts should also be addressed.

(v) Wastewater treatment systems

In choosing a wastewater treatment system, the odour potential should be considered. The most preferred system is the use of aerobic or aerated lagoons (minimum of two-pond system). Less preferable is a facultative lagoon system, while anaerobic ponds have a high odour potential.

Note: the requirements of Rule 40 or Rule 55 of the Regional Air Quality Plan also apply.

(w) Feed formulations

In formulating the appropriate diet – balancing cost and availability of feed and matching these to pig age, health, genotype and sex – the odour potential should be considered. The optimum outcome is when diets are formulated to closely match nutrient inputs to animal needs, and minimise nitrogen excretion.

Research indicates that feed mixtures and formulations, and the natures of additives e.g. antibiotics, influence the odour potential of manure. As yet this is not sufficiently advanced to give comprehensive specific guidance. However, operators should remain abreast of continuing developments. The addition of amino acid as powder rather than in liquid form reduces odour from meal and manure. All feed stock should be kept dry.

(x) Temperature control

A lower shed temperature reduces the rate at which odours are released. It also reduces microbial activity, which is a significant cause of odour.

(y) Contingency planning

A contingency plan should be prepared to safeguard against eventualities such as (i) breakdown or failure of wastewater treatment processes and (ii) a high mortality situation. The contingency plan should be developed in consultation with officers of the Taranaki Regional Council.

(z) Encroachment of incompatible activities

To safeguard the opportunity for future expansion, site owners should remain aware of any proposals to subdivide or to change the zoning (land use controls) of nearby land that may allow the establishment of activities that are incompatible with intensive farming.