

**Integrated Pollution Prevention and Control – Intensive Farming
Northern Ireland**

Undertaking a housing design and management review

Guidance for intensive pig and poultry farmers

February 2009



An Agency within the Department of the
Environment
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Record of changes

Version	Date	Change
1	February 2009	Initial version

Introduction

All farms permitted under the Pollution Prevention and Control Regulations (Northern Ireland) 2003 are required to work to achieve **Best Available Techniques (BAT)**.

Best Available Techniques (BAT) is defined as the most effective and advanced stage of development of activities and their methods of operation which indicates the practical suitability of particular techniques to prevent and where that is not practicable to reduce emissions and the impact on the environment as a whole.

For these purposes: “available techniques” means “those techniques which have been developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the cost and advantages, whether or not the techniques are used or produced inside the United Kingdom, as long as they are reasonably accessible to the Operator”; “best” means “in relation to techniques, the most effective in achieving a high general level of the environment as a whole”, and “techniques” “includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned”.

They will have the following improvement condition in their permit:

A review of existing animal housing design and management practices at the installation shall be carried out and submitted to the Chief Inspector. The review shall identify measures to reduce emissions to all media, the likely cost of such measures and a proposed timetable for their implementation.

The proposals shall be implemented subject to such amendments or additions as considered appropriate by the Chief Inspector.

How to comply with the above condition

- The plan should be submitted within 12 months of the permit being issued. For some installations with uniform, modern and purpose built buildings, the review of housing may be simple, and may result in very little action required to be included in the plan. For others, with a range of building types, often utilising outdated technologies and not specifically designed for their present role, the resulting actions may be more extensive.

- The review should identify those aspects of your housing design and management that contribute to emissions (eg. ammonia, odour, dust, noise) from the installation. This will help you to identify whether any improvements are needed. These may be either by changing management practises (doing things differently) and/or adapting or installing physical structures. The changes you identify will form the actions in your plan.
- There may be a large range of building types and production systems within a single installation. The following guidance explains a systematic approach to carrying out a review of housing on your farm whatever type of buildings you have. This can help you to produce a plan that identifies where improvements may be needed and how they may be achieved.
- Where an installation includes multiple sites, there will need to be a housing review for each individual site.

Before you start

- You will need to refer to the IPPC Standard Farming Installation Rules and Guidance for Poultry Production or Pig Rearing – Version 2, May 2006. These documents set out Best Available Techniques (BAT) for the intensive farming poultry and pig sectors.
- You must complete a review for **each** livestock building in an installation. The template can be used for any building whatever its role.
- In your plan we do not expect you to compromise the health and welfare of your livestock.

Using this guidance

Step 1 - Use the flow charts and guidance notes on pages 5 to 8 of this document to help you identify the standards of design and management that are required to achieve BAT as described in the Standard Farming Installation Rules (SFIR)

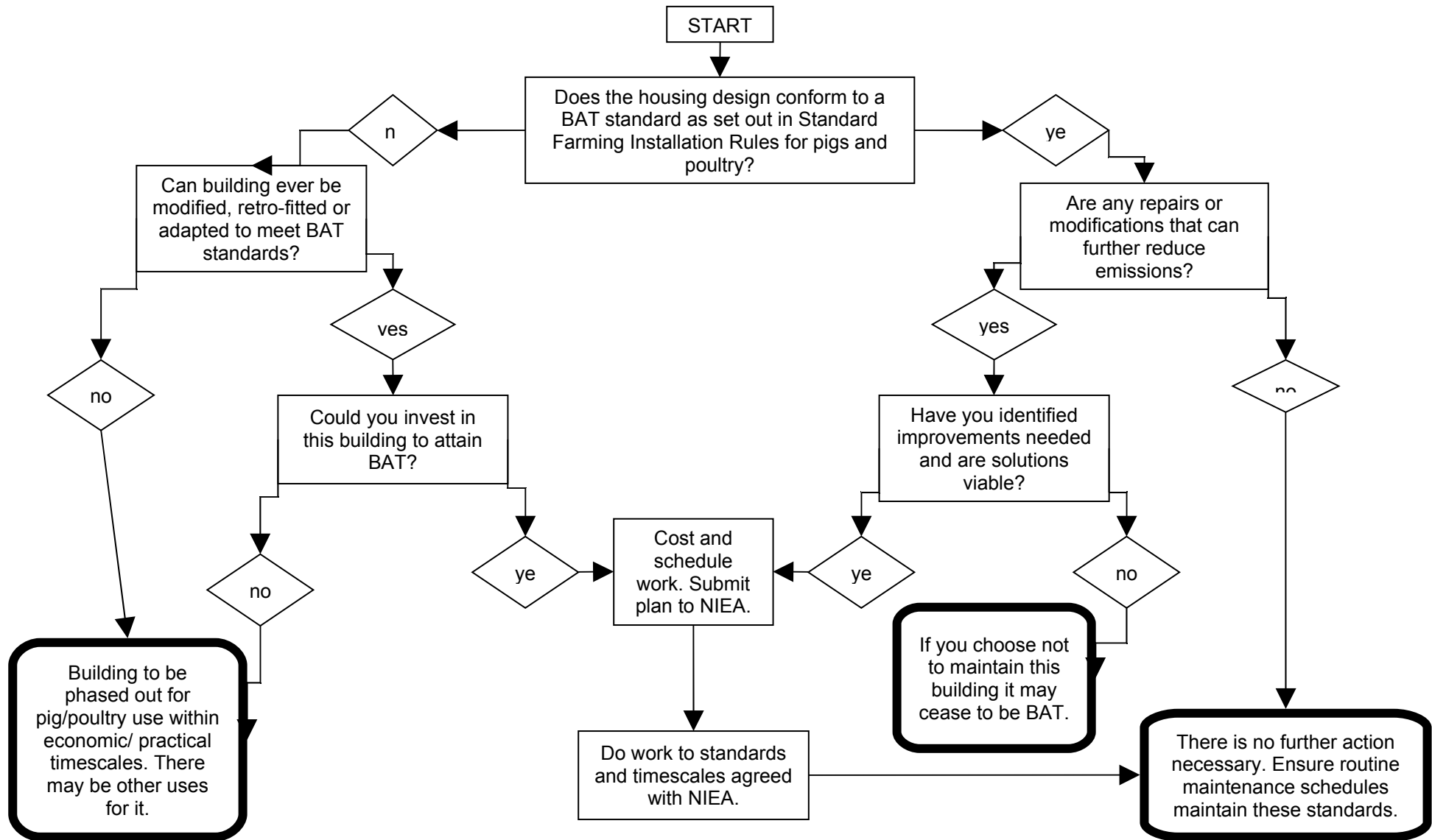
Step 2 - Examine each building on your installation to **identify if the building design and management conforms to BAT** as described in the Standard Farming Installation Rules (SFIRs). Use the example checklist in Appendix 1 (Poultry) or Appendix 2 (Pigs) for each building as a guide to determining whether **the existing building design and management conforms to BAT. The checklist should also be used to note possible improvements where BAT is not currently achieved.**

Step 3 – **Summarise the buildings.** Page 9 of this document is a table for you to provide a summary of all of the housing on the installation. It records whether each building has reached BAT for both design and management. Any building in which either the design or management is not yet BAT should be recorded on the Improvement Plan (see Step 4).

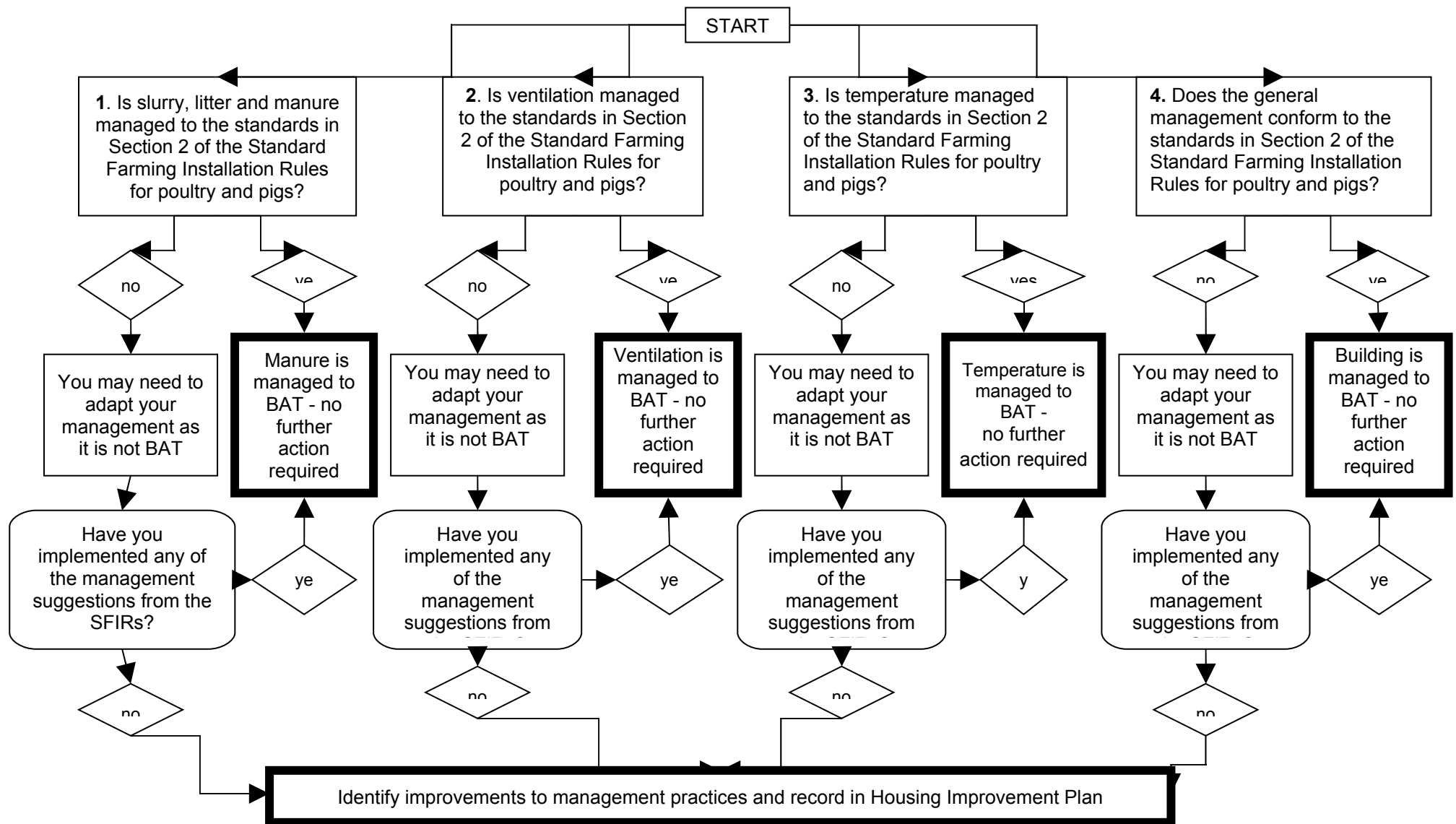
Step 4 – **Produce the Improvement Plan.** Where you identify any improvement that you can make to either the design or management of the housing which will help to reduce the emissions, then you should enter this in the Improvement Plan at the back of this guidance, with a timetable for implementing it.

Step 5 – **Submit the plan** to the Inspectorate within 12 months of your permit being issued. Timescales for improvement must be agreed with the Inspectorate before implementation.

Housing design – the route to BAT



Housing management – the route to BAT



The following list identifies a number of emission reduction measures that may be considered as part of your housing improvement plan when reviewing housing design and management. It is not exhaustive and not all measures will be appropriate for all housing types. Suggestions are also included in the Standard Farming Installation Rules for Poultry and Pigs.

Piped systems – there may be mains pressure drinking supplies, pressurised washer lines or pumped feed lines. Check that:

- there are low pressure cut-off valves at the pump for liquid feed systems to protect against pipe failures;
- there are anti-back siphoning measures installed where appropriate;
- if they are above or below ground, isolation taps or gate valves are present;
- there is protection from frost, impacts and livestock.

Drinkers and feed troughs – these may be tanks/troughs, bowls, nipples, bell, metal or glazed ceramics. Check as appropriate that:

Drinkers

- are set at the correct height;
- shut off correctly;
- can be altered during the production cycle;
- spills can be either caught (in troughs under drinkers), absorbed by litter, or are able to drain away quickly.

Feed troughs

- feeder pipes are tamper-proof;
- automatic feeding systems have emergency cut-out mechanisms installed.

Manure management - this will vary according to the systems employed in any individual building. Check that:

- the location of dunging areas is not being adversely influenced by draughts, damp, temperature;
- the removal of manure and slurry from buildings is frequent and that it works (this may rely on slopes, pumps or vacuum systems) – laying hens with long production cycles may involve removal only at the end of each batch;
- deep littered housing – for both pigs and poultry – has an impermeable base;
- passageways without channel or drain inlets at intervals along their length are scraped and/or littered frequently enough to avoid ponding (which is a source of ammonia and odour).

Ventilation and temperature – when considering how well the building reaches and maintains the desired temperature it may be necessary to look at all aspects of ventilation including both its design and its operation. The following factors can all influence emissions of dust, ammonia and odour from a building.

If the answer to any of the following points is **yes** then you may wish consider addressing them in your Housing Improvement Plan:

- If fans discharge through roofs or side-walls can the dust contaminate otherwise clean roof or surface water run-off?
- Is insulation lacking, damaged or wet? Ineffective insulation contributes to condensation and may adversely affect litter dry matter.
- Does ventilation management cause noise problems – duration, volume, pitch and frequency?

Also, if the answer to any of the following points is **no** then you could consider addressing them in your Housing Improvement Plan:

- Have humidistats or thermostats been checked to ensure that they work and have been calibrated?
- Are vents maintained, efficient, clean, and adequately sized?
- Are automatic ventilation systems which utilise both fans and vents achieving effective temperature and humidity control?
- Is the formulation and the transport of feed managed to minimise dust risk? Meal is inherently dustier than nuts or pellets.
- Is litter introduced into buildings with consideration to minimising the creation of airborne particles?

Summary of buildings on installation - Example

Name of Building	Function	Is Building Management BAT or not BAT?	Is Building Design BAT or not BAT?	Is it identified in Housing Improvement Plan?
<i>Weaner House</i>	<i>Weaner rearing</i>	<i>BAT</i>	<i>Not BAT</i>	<i>Yes</i>
<i>Finisher Shed</i>	<i>Finishers</i>	<i>Not BAT</i>	<i>BAT</i>	<i>Yes</i>
<i>Shed 3</i>	<i>Broiler rearing</i>	<i>Not BAT</i>	<i>BAT</i>	<i>Yes</i>

Housing Improvement Plan – Examples of possible improvements needed and possible solutions and timescales

Area needing Improvement	What needs to be done – possible solutions	Proposed cost	Proposed timescale for completion	Timescale agreed with Northern Ireland Environment Agency
<p>Building design changes – these are likely to involve the largest costs. They may need a staged approach to design, finance, build and commission. You may need flexible milestones to allow external agencies (planning and appeals) to grant approvals etc.</p>				
<p>Weaner house is not BAT</p>	<ul style="list-style-type: none"> • <i>Replace building:</i> <ol style="list-style-type: none"> 1) <i>agree design and location</i> 2) <i>apply for planning permission to construct new building</i> 3) <i>start using new building</i> 4) <i>de-commission old building</i> 		<p>10 years ie. to fit in with investment cycle on the farm/lifetime of current building.</p>	
<p>Building management changes – these are likely to involve the least costs.</p>				
<p>Damp litter at west end of Broiler Shed 3 during rainfall if wind from east</p>	<ul style="list-style-type: none"> • <i>Block up any holes or gaps to prevent rain entering the house</i> • <i>Monitor litter during rainfall events</i> • <i>Extend fan hood at end of building to protect it from rain</i> • <i>Damp-proof wall at west end of building to prevent seepage</i> 		<p>1 month 6 months 9 months if fan hood extension doesn't solve problem</p>	
<p>Manure run-off leaking from finisher shed muck passageway doors</p>	<ul style="list-style-type: none"> • <i>Check floats in drinker to minimise spillages</i> • <i>Can spillages be collected by troughs beneath drinkers</i> • <i>Use more bedding – especially near doorways</i> • <i>Use end pen as straw storage</i> • <i>Install kerb/lip in doorway</i> 		<p>ASAP If no improvement will install barrier at end of current batch</p>	

The above examples show a range of solutions at varying costs. The least costly option may be tried first to achieve the desired improvement. If this does not have the desired effect then you should move on and continue to work through the options until the improvement is satisfactory. The solutions may need to become more complex and cease to be management changes and become building design changes which may need longer timescales and involve higher costs.

Housing Improvement Plan

Permit No: _____

Name: _____

Area needing Improvement	What needs to be done – possible solutions	Proposed cost	Proposed timescale for completion	Timescale agreed with Northern Ireland Environment Agency
Building design changes				
Building management changes				

APPENDIX 1

DETERMINING BAT ON POULTRY INSTALLATIONS

The questions on the following pages are intended as a guide to help operators to identify aspects of the housing design and management that do not conform to BAT and to identify possible improvements that could be introduced to achieve BAT

(1) Housing Design	Yes / No / N/A	Possible Improvements
(a) General Issues		
Are drinkers and troughs designed to prevent leakage and optimise water usage?		
Are houses well insulated? i.e. to a U-value of 0.4W/m ² /°C or better. (Where poultry rearing systems use housing with open sides, insulation is not required).		
Is there a damp-proof course present in the floors?		
Are the design, management and operation of the housing on the installation in accordance with your PPC Permit application?		
(b) Broiler, Broiler Breeder, Replacement Pullets and Turkey Systems – also applicable for free range poultry meat systems		
<p>Is housing designed as follows?</p> <ul style="list-style-type: none"> • A naturally ventilated house with a fully littered floor and equipped with non-leaking drinking systems; or • A fan ventilated house with a fully littered floor and equipped with non-leaking drinking systems; or • Other techniques that provide equivalent or better emission minimisation. 		
Are open turkey houses and free range houses aligned at right angles to the prevailing wind direction and located to ensure exposure to natural airflow?		

(c) Laying Hens and Replacement Pullet Systems

Are caged systems designed and operated with:

- Deep pit with ventilated manure store; or
- Manure removal, at least twice a week, by way of manure belts to covered storage; or
- Vertical tiered cages with manure belt with forced air drying, where the manure is removed at least once a week to a covered storage; or Vertical tiered cages with manure belt with whisk forced air drying where manure is removed at least once a week to a covered storage; or
- Vertical tiered cages with manure belt with improved forced air drying where the manure is removed from the house at least once a week to covered storage; or
- Vertical tiered cages with manure belt with drying tunnel over cages, after 24-36 hours, the manure is removed to covered storage; or

—
Other techniques that provide equivalent or better emission minimisation.

(d) Barn and Free Range Systems		
<p>Are systems designed and operated with:</p> <ul style="list-style-type: none"> • Deep litter system with forced air drying; or • Deep litter system with perforated floor and forced air drying; or • An aviary system with or without range and or outside scratching area; or • Other techniques that provide equivalent or better emission minimisation. • Laying nests should be located above or adjacent to the slatted area. • Any bell drinkers shall be located over the slats. • Systems to provide forced drying of manure under the slatted area are being researched. 		
(e) Duck Systems		
<p>Are systems designed and operated with an unrestricted naturally ventilated house or a well insulated fan ventilated house with:</p> <ul style="list-style-type: none"> • A partly-slatted floor with impermeable drainage channels and effluent storage area; or • A fully-slatted floor with impermeable drainage channels and effluent storage area; or • A fully littered floor with a water system positioned above a gully and covered drainage channels and effluent storage areas; or • Other techniques that provide equivalent or better emission minimisation. 		

(2) Housing Management		
(a) Litter and Manure	Yes / No / N/A	Possible Improvements
Are drinkers designed and operated to prevent leakage?		
Are all reasonable steps taken to ensure that litter is maintained in as dry a condition as possible?		
Is the ventilation, heating and insulation system correctly managed so that they do not adversely impact on litter/manure quality?		
In deep pit layer housing are air currents maintained so that air is drawn over the manure to dry it?		
In deep pit layer housing is there an impermeable base and is it checked regularly for cracks, leaks etc.?		
In deep pit layer housing is rain prevented from entering the manure storage area?		
Are all buildings maintained in good repair to minimise water leaks into the house which may increase the moisture content of litter and/or manure?		
Are house floors impermeable and are they checked regularly for potential cracks or leaks?		
Are belt cleaning systems designed and operated to optimise air flow and to maximise drying on the belt?		
Are steps taken to avoid ponding in passageways to minimise ammonia and odour emissions?		
For turkey houses is frequent removal of litter from the houses carried out at intervals during the fattening period to reduce the ammonia emissions, as the temperature of the litter and droppings does not increase?		
Is manure mixed during the turkey fattening period to give maximum uptake of ammonia by sawdust/shavings/chopped straw?		

In layer housing using manure belts, can the frequency of belt cleaning be increased to reduce emissions?		
Are changes in litter quality investigated and steps taken to rectify any problems? e.g. check: ventilation, temperature, humidity, diet, bird health (drinking and excreting patterns) stocking density, management.		
(b) Temperature & Ventilation		
Does temperature and ventilation match the health and welfare needs for the age and number of birds throughout the crop cycle?		
Are ventilation systems designed and operated to remove moisture in all weather and seasonal conditions?		
Does ventilation management cause any noise problems incl. duration, volume, pitch, frequency?		
Are target conditions for different weather conditions specified and complied with?		
Do you ensure that air speeds across the house are not largely different from one area to another?		
Are houses free from draughts?		
Are ventilation rates and housing conditions at all times adequate to provide sufficient fresh air for the birds? Are accumulations of ammonia, hydrogen sulphide, carbon dioxide, carbon monoxide and dust avoided?		
Is the integrity of house walls/panels checked regularly?		
Is integrity of fan shrouds checked regularly?		
Are humidistat's or thermostats checked to ensure they work and have they been calibrated?		

(c) General Management		
For free-range poultry, are the areas around pop-holes protected to prevent rain from entering housing? Is the ground around the pop-holes managed to prevent capping or erosion of the surface?		
Are floors and walls kept clean?		
Are cracks and damaged areas of floors and walls repaired?		

NOTES BELOW REFER TO ALL EXISTING POULTRY HOUSING

The notes below should be taken into account when devising an improvement plan:

1. Emissions from poultry housing are affected by factors such as ventilation, temperature and management. **Changes to management** of these should only be introduced where such changes will not adversely affect poultry health and welfare.
2. **Ventilation** – Ventilation should meet poultry health and welfare needs for the age and number of birds. The target rates for different weather conditions should be calculated in conjunction with your equipment supplier or poultry advisor.
3. **Temperature** – Temperature should meet both health and welfare needs for the age and number of birds. Age, flock size, floor type, air speed, feed and water intake can markedly affect temperature requirements and should be considered when determining the appropriate temperature.
4. **Structural improvements** – Whether structures or buildings are replaced or modified will be a decision for you in conjunction with the Inspector, depending on local needs for emission reduction.
5. **Retro-fitting** new structures to existing buildings, needs to be carefully considered and costed. Research suggests that it may be more cost effective to replace buildings or structures. Any replacements should give equivalent emission reduction to those techniques outlined in the rules for new houses (i.e. rules 2.3.3.13 – 2.3.3.18), and should be planned to fit the business cycle of the farm.

APPENDIX 2

DETERMINING BAT ON PIG INSTALLATIONS

The questions on the following pages are intended only as a guide to help operators to identify aspects of housing design and management that do not conform to BAT and to identify possible improvements that could be introduced to achieve BAT

(1) Housing Design	Yes / No / N/A	Possible Improvements
(a) General – all systems		
Are drinkers and troughs designed to prevent leakage and optimise water usage?		
Is housing designed and managed to optimise energy consumption?		
Are the design, management and operation of the housing on the installation in accordance with your PPC Permit application?		
(b) Slurry systems – general		
Does slat design allow maximum transfer of dung and urine to the transfer channels?		
Are channels designed to transfer slurry to storage facilities?		
Are channels designed so that slurry is not stored in the channels themselves?		
(c) Dry Sow Housing – slurry systems		
Does the house have (a) a partly-slatted floor with a reduced area manure pit? OR		
(b) a fully or partly-slatted floor with a vacuum system for frequent slurry removal? OR		
(c) employ other techniques that provide equivalent or better emission minimisation? If yes, please describe.		

(d) Farrowing Sows including piglets – slurry systems

<p>Does the slurry system for farrowing sows including piglets comprise a fully or partly-slatted floor with one of the following?</p> <ul style="list-style-type: none"> ➤ A combination of water and manure channel <i>or</i> ➤ A flushing system with manure gutters <i>or</i> ➤ A manure pan underneath <i>or</i> ➤ Other techniques that provide equivalent or better emission minimisation – please describe 		
<p>Are farrowing pens designed to provide a slurry channel at the rear of the sow, away from the feeding area?</p>		
<p>Is there a smaller slatted area added under the water tray or trough to catch feed and water spills and manure from the piglets?</p>		

(e) Weaners – slurry systems

<p>Is the slurry system designed and operated with a pen or with one of the following?</p> <ul style="list-style-type: none"> ➤ Flatdeck with fully or partly-slatted floor with vacuum system for frequent slurry removal <i>or</i> ➤ Flatdeck with fully slatted floor beneath which there is a concrete sloped floor to separate faeces and/or urine <i>or</i> ➤ Partly-slatted floor (2 climate system) <i>or</i> ➤ Partly-slatted floor & sloped or convex solid floor <i>or</i> ➤ Partly-slatted floor with a shallow manure pit & channel for spoiled drinking water <i>or</i> ➤ Other techniques that provide equivalent or better emission minimisation – please describe 		
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(f) Growers/Finishers – slurry systems

Is the slurry system designed and operated with one of the following?

- Fully slatted floor with vacuum system for frequent slurry removal *or*
- Partly-slatted floor with a reduced manure pit, including slanted walls and a vacuum system *or*
- Partly-slatted floor with a central convex solid floor at the front of the pen, a manure gutter with slanted sidewalls and sloped manure pit *or*
- Other techniques that provide equivalent or better emission minimisation – please describe

(g) Solid Floor Systems

Are solid floor systems designed and operated so that sufficient straw or other bedding material is used to provide a clean dry bed?

Are solid floor systems designed and operated so that scraped areas prevent ponding or build up of urine?

Are dunging and lying areas clearly differentiated to ensure that lying areas are kept dry at all times?

Are bedded areas sloped to drain urine and prevent ponding?

Are dunging areas cleaned out by scraping at least 3 times per week?

In deep straw systems, do bedded areas and straw yards have sufficient straw or other bedding material to keep the lying area clean and dry and to bind nitrogen to reduce ammonia emissions?

Are floors kept free from urine and slurry puddles through: provision of additional bedding to soak it up and/or management to address puddles as they arise i.e. by scraping or washing down?

(2) Housing Management		
(a) Slurry Systems – slurry management and dunging behaviour	Yes / No / N/A	Possible Improvements
Is the area under the slats cleared of slurry frequently? (i.e. when there is sufficient slurry to flow out)		
Are lying areas kept clean through high standards of management and effective control of environmental conditions?		
Are floor space allowances, including partly-slatted floor space allowances, calculated to minimise dunging in lying areas?		
Are floors kept free from urine and slurry puddles through: provision of additional bedding to soak it up and/or management to address puddles as they arise i.e. by scraping or washing down?		
Where water spray or dripper systems are employed are they used over the slats to cool the pigs in hot weather and encourage good dunging behaviour? (ie. in partly slatted systems).		
Where water spray or dripper systems are employed are they checked and maintained to prevent leakage or loss of water?		
(b) Solid Floor Systems – slurry/manure management and dunging behaviour		
Are dunging and lying areas clearly differentiated to ensure that the lying areas are kept clean and dry?		
Are scraped areas operated to prevent ponding or build up of urine?		
Are dunging areas cleaned out by scraping at least three times a week?		
In deep straw systems, do bedded areas and straw yards have sufficient straw or other bedding material to keep the lying area clean and dry and to bind nitrogen to reduce ammonia emissions?		
Are floors kept free from urine or slurry puddles, either through: <ul style="list-style-type: none"> • the provision of additional bedding material to soak it up, or • management to address puddles as they arise? 		

(c) Ventilation & Temperature

Are draughts avoided in lying areas?		
Are draughts minimised under slatted flooring by dividing the airspace with plastic sheet?		
Are dunging areas in naturally ventilated building sited beneath air inlets?		
Are lying areas sited under baffled inlets in low-pressure fan ventilated buildings?		
Is a minimum temperature maintained such that pigs do not need to huddle together?		
Where artificial heating is provided to weaners, are controls used to match heating needs to minimise energy wastage ie. so that heat is not wasted by being drawn out of the building?		
Is weaner accommodation in 'umbrella buildings' provided with sufficient ventilation to keep manure temperatures low?		

(d) General Management

Are drinkers and troughs designed <u>and operated</u> to prevent leakage?		
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NOTES BELOW REFER TO ALL EXISTING PIG HOUSING

The notes below should be taken into account when devising an improvement plan:

Emissions from pig housing are affected by factors such as ventilation, temperature and management of surfaces. **Changes to management** of these should only be introduced where such changes will not adversely affect pig health and welfare.

- **Ventilation** – Ventilation should meet pig health and welfare needs for the age and number of pigs. The target rates for different weather conditions should be calculated in conjunction with your equipment supplier or pig advisor.
- **Temperature** – Temperature should meet pig health and welfare needs for the age and number of pigs. Liveweight, group size, floor type, air speed, feed and feed intake can markedly affect temperature requirements and should be considered when determining the minimum appropriate temperature.
Slatted floors and low feed levels generally require increased temperatures whereas straw bedding, high feed levels and higher body weights generally require reduced temperatures.
- **Structural improvements** – Whether structures or buildings are replaced or modified will be a decision for you in consultation with the Inspectorate, depending on local needs for emission reduction.
- **Retro-fitting** new structures to existing buildings, needs to be carefully considered and costed. Research suggests that it may be more cost effective to replace buildings or structures. Any replacements should give equivalent emission reduction to those techniques outlined in the rules for new houses (i.e. rules 2.3.3.9 – 2.3.3.17), and should be planned to fit the business cycle of the farm.

You should discuss changes to management with your pig advisor.