

Wilkinson Brothers  
EPR/UP3532QH/V004  
Part A Doc 1

List of Partners cont'd:

Mr Thomas Charles Wilkinson  
Hallbrooke  
Hall Farm  
Sudbrooke Park  
LINCOLN  
LN2 2YD



Wilkinson Brothers  
EPR/UP3532QH/V004  
Doc 01 Pre-Application Advice

**From:** Sellers, Christine <[christine.sellers@environment-agency.gov.uk](mailto:christine.sellers@environment-agency.gov.uk)>  
**Date:** Tuesday, 29 June 2021 at 15:03  
**To:** [jane.wilkbros@btinternet.com](mailto:jane.wilkbros@btinternet.com) <[jane.wilkbros@btinternet.com](mailto:jane.wilkbros@btinternet.com)>  
**Subject:** Pre Application ammonia screening for EPR/UP3532QH/V004 - Final Advice

Hi Jane,

**RE: Pre Application ammonia screening for EPR/UP3532QH/V004 - Hall Farm**

Thank you for your quick response. Rather than run a screening, as this would be an environmental improvement, I have completed the betterment calculations below:

The extant permit permits the stocking of poultry at both Grange Farm Poultry Unit and Hall Farm.

There are no proposed changes at Grange Farm Poultry Unit..

**Currently permitted at Grange Farm and Hall Farm:**

**Grange Farm Poultry Unit:** 410,000 broilers X (emission factor) 0.034 = 13,940 kg NH3/year

**Hall Farm:** 46,000 broiler breeders X (emission factor) 0.21 = 9660 kg NH3/year

**Total** = 23,600 kg NH3/year

**Proposed:**

**Grange Farm Poultry Unit:** 410,000 broilers X (emission factor) 0.034 = 13,940 kg NH3/year

**Hall Farm:** 149,000 broilers X (emission factor) 0.034 = 5066 kg NH3/year

**Total** = 19,006 kg NH3/year

The proposed changes would result in an annual **total reduction of 4594 kg NH3/year (~19.5%)**

Lastly, I have attached the current request form which shows the emission factors for reference, as the 0.29 kg NH3/livestock place/year is an out of date emission factor.

I hope this helps.

Kind regards,

**Christine Sellers**

**Permitting Officer (Installations)**

**National Permitting Service ..... Part of National Operations**

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Please consider the Environment before printing this email.

This document contains supporting information which supplements the Environmental Permit variation application being submitted by Wilkinson Brothers for the operation of a broiler farm. This section provides a non-technical summary of the proposed operations at Hall Farm and an outline of the measures which will be used to control environmental impacts.

1. The changes we are proposing in this Variation are:

a. The farm already holds an Environmental Permit (EPR/UP3532QH), which permits stocking capacity of 410,000 broilers at Grange Farm and 46,000 broiler/breeders at Hall Farm. The changes covered by this variation application comprise the reduction of broiler/breeder capacity to zero and the increase in proposed stocking capacity of broilers to 559,000 birds. Broiler places at Grange Farm will remain at 410,000, while broiler places at Hall Farm will now be 149,000, producing a net increase in bird places of 103,000. We will demolish sheds 5 and 6 at Hall Farm.

b. Proposed Housing Specifications at Hall Farm:

House	Broiler Places	Dimensions
1	41,600	1,932.38
2	41,600	1,932.38
3	33,800	1,570.06
4	32,000	1,486.45
	149,000	

c. We have sought pre-application advice from the Environment Agency; the conclusions are that our proposals would constitute an environmental improvement. Calculations show that NH<sub>3</sub> emissions would be reduced from 23,600kg NH<sub>3</sub>/year to 19,006kg NH<sub>3</sub>/year (Doc 01).

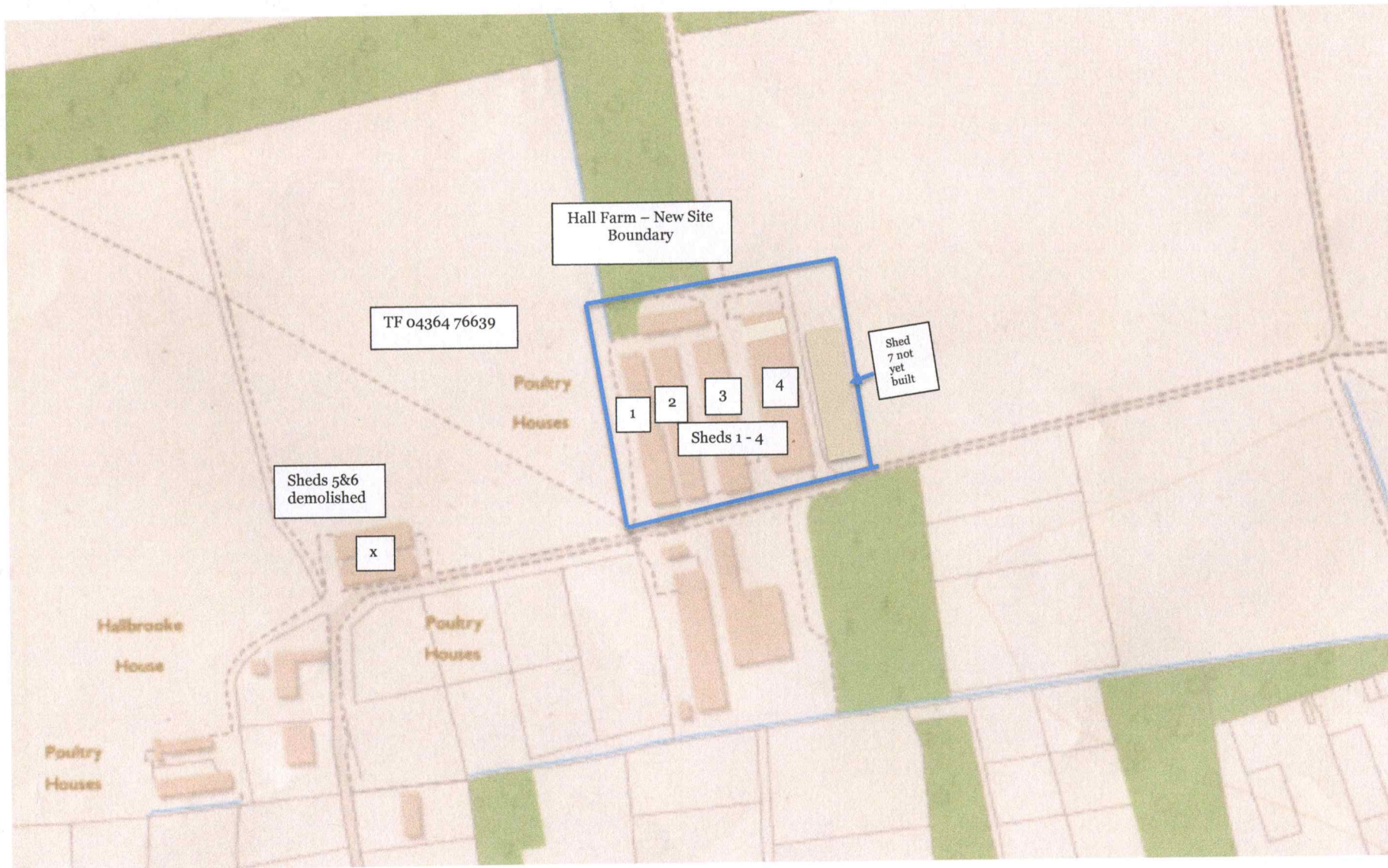
2. Brief Description of Activities:

a. Prior to the arrival of the day-old birds, the concrete floors are covered with straw to a depth of 5cm and the houses are heated to 30°C. The sheds are heated by straw-burning biomass boilers, which ensures that relative humidity is kept to around 45% and the litter is kept dry, which in turn significantly improves air quality and bird welfare and reduces ammonia emissions, odour and particulates. Feed is stored on site in bulk bins. Water is provided via nipple drinkers fitted with drip cups which are designed to minimise spillage. Keeping feed silos and pipes covered, cleaning up any feed spills immediately and efficient ventilation systems further control particulates.

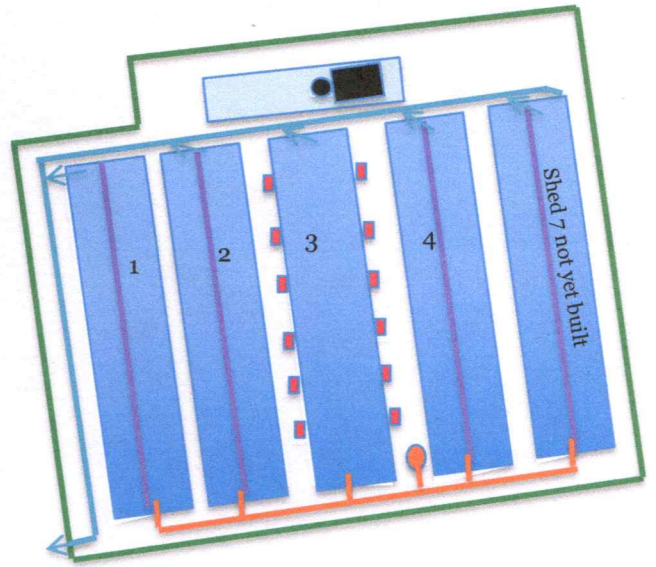
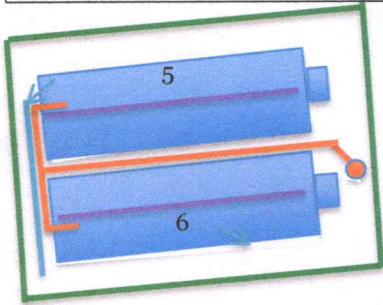
- b. Houses 1-11 at Grange Farm have high velocity roof fan outlets and gable end fan outlets; houses 1, 2, 4 at Hall Farm have high velocity roof fan outlets; shed 3 at Hall farm has side fan outlet.
  - c. Birds which die during the crop cycle are removed from houses and collected by a licenced contractor.
  - d. At the end of each growing period, the litter is removed from the houses and used for spreading on land. The empty houses will then be power washed, disinfected and fumigated ready for the arrival of the next crop.
3. A full Environmental Management System is in place under the existing permit, which contains procedures to ensure potential farm emissions to air, land and water are controlled and managed, including noise and odour. This has been reviewed and updated as part of the proposed revisions to the layout.

## Contents

1. Assessment of BAT
2. Permit EPR/UP3532QH/V003
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4. Key Site Information, Site Plans & Accident Plan
5. NSF certification
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15. Poultry Manure Management Plan and Spreading Records
16. Livestock Numbers & Movements
17. Poultry Passport & Training Records
18. Risk Assessments and Management Plans:
  - a. H101 Odour Risk Assessment and Management Plan
  - b. H102 Noise and Vibration Risk Assessment and Management Plan
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  - e. H105 Raw Materials Inventory
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  - g. Bio Aerosol Risk Assessment, Methods for Reduction of Particulates
  - h. Ammonia Reduction techniques
  - i. Site De-Commissioning Plan
19. 4-Yearly Reviews
20. Site Visits



Sheds 5&6 to be demolished



**Key:**



Site boundary

Boiler house & Stack



High velocity roof fans



Side fan outlets



Foul water drainage & tanks



Surface water drainage

Source of Impact	Impact e.g. odour, noise, dust, ammonia, run-off, spillage	Receptor Air, water, land Humans, plants	Description of Negative Impact  Nature of impact i.e. short term (ST), medium (MT) or long term (LT)	Significance of negative impacts: major +++ moderate ++ minor + nil 0	Mitigation / Management Measures e.g. installation planning, technical measures
Poultry production (whilst houses are stocked and at clean-out)	Ammonia	Air	Aerial deposition and direct toxic effect on trees (ST)	+++	<ul style="list-style-type: none"> <li>Litter kept friable</li> <li>Feed formulated to match flock requirements</li> <li>Converting breeder site to broilers will reduce the ammonia emissions from 23,600kg NH3/year to 19,006kg NH3/year.</li> </ul>
		Land	Nutrient enrichment of soils (LT)	++	
		Plants	Changes to sensitive ecosystems (LT)	+++	
	Dirty water (e.g. due to run off during or after clean-out)	Land	Nutrient enrichment of soils (LT)	+++	<ul style="list-style-type: none"> <li>All dirty water directed to foul water store</li> <li>Used litter spilt on roadways during clean-out is swept up</li> </ul>
		Water	Nutrient enrichment of water courses (MT)	+++	
	Noise	Humans	Nuisance (LT)	++	<ul style="list-style-type: none"> <li>Measures as set out in Noise Management Plan, document reference EP10</li> </ul>



Source of Impact	Impact e.g. odour, noise, dust, ammonia, run-off, spillage	Receptor Air, water, land Humans, plants	Description of Negative Impact  Nature of impact i.e. short term (ST), medium (MT) or long term (LT)	Significance of negative impacts: major +++ moderate ++ minor + nil 0	Mitigation / Management Measures e.g. installation planning, technical measures
Poultry production (whilst houses are stocked and at clean-out) - continued	Odour	Humans	Nuisance (ST)	++	<ul style="list-style-type: none"> <li>Measures as set out in Odour Management Plan, document reference EP09</li> </ul>
	Zoonoses and notifiable diseases	Humans Livestock	Human and livestock health implications (ST)	+	<ul style="list-style-type: none"> <li>Detailed biosecurity precautions in place e.g. frequent stock inspection, use of disinfectants and appropriate clean overalls, boots etc for staff and visitors to prevent spread of disease</li> </ul>
	Feed (e.g. due to spillage from bins)	Land Water	Nutrient enrichment of soils (LT)  Nutrient enrichment of water courses (MT)	+ +++	<ul style="list-style-type: none"> <li>Feed bins are regularly checked for signs of damage and wear</li> <li>Feed bins are barrier-protected to prevent collision damage</li> </ul>
	Pests	Humans	Nuisance caused by vermin and flies	+	<ul style="list-style-type: none"> <li>Pest control is carried out by own staff who have been appropriately trained</li> </ul>

Source of Impact	Impact e.g. odour, noise, dust, ammonia, run-off, spillage	Receptor Air, water, land Humans, plants	Description of Negative Impact Nature of impact i.e. short term (ST), medium (MT) or long term (LT)	Significance of negative impacts: major +++ moderate ++ minor + nil 0	Mitigation / Management Measures e.g. installation planning, technical measures
Use of vehicles on site	Feed, used litter or dirty water (e.g. due to spillage from vehicles)	Land Water	Nutrient enrichment of soils (LT) Nutrient enrichment of water courses (MT)	+ +++	<ul style="list-style-type: none"> <li>Any feed spillage beneath bins is cleared up by driver</li> <li>Used litter is covered in trailers before leaving the site</li> <li>Machinery used to remove dirty water from tank is kept in optimum working order</li> </ul>
	Noise	Humans	Nuisance (ST)	++	<ul style="list-style-type: none"> <li>Measures as set out in Noise Management Plan, document number EP10</li> </ul>
	Odour	Humans	Nuisance (ST)	+	<ul style="list-style-type: none"> <li>Measures as set out in Odour Management Plan, document EP09</li> </ul>
Storage facilities	Dirty water (e.g. due to overflow or leakage from foul water reservoir)	Land	Nutrient enrichment of soils (LT)	++	<ul style="list-style-type: none"> <li>Appropriate staff have been trained</li> </ul>
		Water	Contamination of surface and ground waters (MT)	+++	

Source of Impact	Impact e.g. odour, noise, dust, ammonia, run-off, spillage	Receptor Air, water, land Humans, plants	Description of Negative Impact Nature of impact i.e. short term (ST), medium (MT) or long term (LT)	Significance of negative impacts: major +++ moderate ++ minor + nil 0	Mitigation / Management Measures e.g. installation planning, technical measures
Storage facilities – continued	Fuels, disinfectants and other chemicals (e.g. due to spills or leakage)	Water	Contamination of surface and groundwaters with consequential effects on animals (ST)	+++	<ul style="list-style-type: none"> <li>All storage tanks are bunded</li> <li>Smaller containers are kept in a purpose-built chemical store</li> <li>Environmentally-friendly products are used where possible</li> </ul>
		Land	Contamination of land (MT)	+++	
	Humans	Human health issues (ST)	+	<ul style="list-style-type: none"> <li>Accident management plan prepared EP03 and staff have received training</li> <li>COSHH data sheets for products used are kept on site</li> <li>Spill kits are readily accessible to contain spillage</li> </ul>	

Introduction

This plan has been prepared as part of the Environmental Permitting Management Plan because there are sensitive receptors (neighbouring dwelling houses) within 400 metres of the installation.

The purpose of this plan is to:

- Establish the likely sources of noise and/or vibration arising from a typical broiler unit
- Set out the procedures followed at the installation in order to prevent or minimise noise levels

The following table sets out the likely sources of noise and the procedures followed to minimise noise levels.

**Typical Sources of Noise and Vibration and Actions Taken to Minimise Them.**

Typical Sources of noise/vibration problems	Pathway	Consequence	Actions taken to minimise risk	What risk still remains	Completion date/in place
Large vehicles travelling to and from the farm	Air	Noise annoyance	All vehicles are required to be driven onto and off the site with due consideration for neighbours.	Not significant	In place
			Depletion of the sheds takes place once a year and is carried out with consideration for neighbours.	Not significant	In place
			Potholes in the road to be filled in	Not significant	In place
Large vehicles on site for: Delivering feed; Catching birds at the end of crop period;	Air	Noise annoyance	All vehicles are required to be well maintained and driven slowly around the site. Engines to be switched off when not in use. Vehicles fitted with an audible reversing warning system (not to be used at night).	Not significant	In place

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 Doc 06 Noise Management Plan

Typical Sources of noise/vibration problems	Pathway	Consequence	Actions taken to minimise risk	What risk still remains	Completion date/in place
Large vehicles on site for: Cleaning out of sheds at the end of crop period	Air	Noise annoyance	Vehicles fitted with an audible reversing warning system used only in daytime; the exception is when birds are removed at night.	Not significant	In place
Small vehicles travelling to and from the farm, eg staff, visitors, delivery vans	Air	Noise annoyance	All vehicles must be driven slowly and with consideration onto site.	Not significant	In place
Feed transfer from lorries to feed bins	Air	Noise annoyance	Vehicles must be well-maintained and designed so that noise during feed transfer is minimised.	Not significant	In place
Operation of fans	Air	Noise annoyance	Efficient, modern fans used, maintained in good condition to avoid excessive noise.	Not significant	In place
Alarm system and stand-by generator	Air	Noise annoyance	System test carried out weekly, timed to avoid causing nuisance to neighbours; All electrics and equipment are routinely maintained so that back-up systems rarely need to be used in practice.	Not significant	In place
Birds	Air	Noise annoyance	During loading/unloading of birds, bird noise limited by careful handling and prompt removal of full lorry from site. Noise from the birds during the crop period is not considered a likely cause for complaint.	Not significant	In place

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 Doc 06 Noise Management Plan

Typical Sources of noise/vibration problems	Pathway	Consequence	Actions taken to minimise risk	What risk still remains	Completion date/in place
Personnel	Air	Noise annoyance	Staff, catchers and other contractors are required to carry out their work without creating excessive noise from shouting, use of radios etc.	Not significant	In place
Repairs	Air	Noise annoyance	If repairs on site are required, the work is always undertaken with due regard for potential noise nuisance and it is carried out during the day. In the event of major repair work being undertaken which is likely to cause significant noise and disruption, neighbouring residents will be notified in advance.	Not significant	In place

The Noise Management Plan has been reviewed and we consider that all appropriate measures are in accordance with BAT and conform with the standards in How to Comply, therefore no further action is required.

Introduction

This plan has been prepared as part of the Environmental Permitting Management Plan because there are sensitive receptors (neighbouring dwelling houses) within 400 metres of the installation. The following table sets out:

- The likely sources of odour arising from a typical broiler unit;
- The procedures followed or planned at the installation in order to prevent or minimise odour levels.

**Typical Odour Sources and Actions Taken to Minimise Odours**

Typical source of odour	Pathway	Potential risks and problems	Actions taken to minimise odour and odour risks	Completion date
Manufacture and selection of feed	Air	The use of poor quality and odorous ingredients Feeds that are unbalanced in nutrients leading to increased excretion and litter moisture and emissions of ammonia and other odorous compounds to air	Feed specifications are prepared by the feed compounder's nutrition specialist Feed is supplied only from UKASTA accredited feed mills, so that only approved raw materials are used	In place
Food delivery and storage	Air	Spillage of feed during delivery and storage Creation of dust during feed delivery	Feed delivery systems are sealed to minimise atmospheric dust Any spillage of feed around the bin is immediately swept up The condition of feed bins is frequently checked so that any damage or leaks can be identified.	In place
Ventilation system	Air	Inadequate air movement in the house leading to high humidity and wet litter Inadequate system design causing poor dispersal of odours	The ventilation system is regularly adjusted according to the age and requirements of the flock. Biomass boilers produce dry heat, which has huge benefits to the houses' environment; CO <sup>2</sup> and water are eliminated from heating so air/litter quality are greatly improved and ideal house environment is easily achieved. Ventilation is more manageable throughout the year.	In place  In place

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 Doc 07 Odour Management Plan

Typical source of odour	Pathway	Potential risks and problems	Actions taken to minimise odour and odour risks	Completion date
Litter management	Air	Odours arising from wet litter The use of insufficient or poor quality litter Spillage of water from drinking systems Disease outbreaks, leading to wet litter	Controls on feed and ventilation help to maintain litter quality; use of biomass boilers produces dry heat and improves litter quality (see ventilation system above). Use of drinking systems that minimise spillage Insulated walls and ceilings to prevent condensation Concrete floors to prevent water ingress Stocking density at optimal levels to prevent overcrowding Use of a health plan with specialist veterinary input as necessary.	In place
Carcass disposal	Air	Inadequate storage of carcasses on -site	Carcasses are removed daily by GH By Products Limited	In place
House clean-out	Air	Creation of dust associated with litter removal from houses Use of odorous products to clean houses	Litter is carefully placed into trailers positioned at the entrance to houses. When full, trailer is covered Only approved and suitable products are used	In place
Used litter	Air	Storage of litter on-site Transport of litter and applications to land	There is no storage of litter outside the houses at any time Litter is transported in covered trailers Most of the litter is used for manure and is ploughed in the same day	In place
Dirty water management	Air	Standing dirty water during the production cycle or at clean out Applications of dirty water to land	Areas around the house are concreted and remain clean during the production cycle. At clean out, dirty water is directed to a foul water store and is then irrigated onto crops	In place

The Odour Management Plan has been reviewed and we consider that all appropriate measures are in accordance with BAT and conform with the standards in How to Comply, therefore no further action is required.



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**EPR/UP3532QH**

**Doc 08 Bio Aerosol Risk Assessment – Methods for Reduction of Particulates**

<b>Source of Dust</b>	<b>Risk factors</b>	<b>Actions Taken</b>
Poultry Feed	Dust from feed silos Storage of feed Feed spills Feed ingredients	Silos and pipes are covered. Feed is stored in covered silos. Any feed spills are immediately cleaned up All feed used is pelleted which produces little or no dust.
Bedding	Type and treatment of bedding	Rape straw is used for bedding. Biomass boilers heat the poultry sheds which keeps the bedding in optimum condition, moisture content being around 20-25%, thus reducing potential for dust.
	Amount and application of bedding	Straw is supplied in bales and opened and spread within the houses, thus containing any dust within the houses.
Relative Humidity	Low humidity may increase dust	The dust output of a broiler house will vary according to how well the ventilation system manages the litter quality. The key to litter quality is based on keeping the relative humidity level at around 45% and the moisture content of the litter at around 20-25%, thus reducing dust.
Ventilation	Inadequate ventilation systems may cause dust to be emitted to outside	The velocity of the incoming air and the thickness of the inlet opening are crucial to creating the correct air pattern and distribution. The velocity of the air at the inlets is directly related to the differential negative pressure caused by the level of fan extraction. The system monitors the differential pressure and controls the inlets according to the set pressure relevant for the building width and design. Proper airflow and direction is set up and calibrated by smoke tests carried out by the commissioning engineers.
House Cleaning	Air contamination in houses and outside	Houses are thoroughly cleaned after each crop. During cleaning out, any dust on the walls and roof are washed into the litter, which is then immediately taken from the site and spread on land as a valuable source of fertilizer for our arable crops. There is no risk of spreading dust to the outside of the sheds.

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**EPR/UP3532QH**  
**Doc 08 Bio Aerosol Risk Assessment – Methods for Reduction of Particulates**

<b>Source of Dust</b>	<b>Risk factors</b>	<b>Actions Taken</b>
Bird Numbers	Reduced flock numbers	Flocks are thinned before the end of the crop cycle. In a shed of 30,000 broilers, 6,000 will be depleted before the end of the cycle. Fewer birds means less activity to produce dust.
Crop Cycles	Reduce crop cycles from 42 to 35 days	Reducing the crop cycles from 42 to 35 days produces smaller birds and consequently less dust.

**Conclusion:**

The methods we use to minimise and control dust inside the poultry sheds ensure that there is minimal risk of particulates contaminating the outside environment. Any small amount of dust, which does escape from the poultry sheds via the ventilation system will settle on the surrounding arable land.

**1 Review of present practice:**

- a Other suppliers/tariffs considered? n/a: electricity purchased through buying group.
- b Are appliances automatically controlled? Yes
- c Are buildings metered separately? No
- d Do employees switch off equipment/lights? Movement detectors installed
- e Are low-energy lamps used? High frequency lighting systems used. 4% of the floor area has natural lighting with windows to reduce energy consumption.
- f Are smaller 26mm diameter fluorescent tubes used? Yes
- g Are thermostats checked regularly? Yes
- h Are buildings insulated to current standards? Yes
- i Are lighting systems switched independently? Yes
- j Are you planning future investment in heating systems? No - 3 biomass boilers in use at Grange Farm, 1 at Hall Farm

**2 Review of electricity consumption in broiler units**

	Usage	Cost
Annual usage/night rate:	289,549kWh	
Annual usage/day rate:	725,223kWh	
Total:	1,014,772kWh	£144,057

**3 Waste minimisation – opportunities for savings**

- b Do you monitor energy usage? Yes
- c Can you reduce energy costs in lighting? Windows installed, LED lighting used
- d Can you install natural ventilation? 4% of floor area has natural ventilation (windows).
- e Can you fit automatic temperature controls? Installed.
- f Do you check control settings regularly? Yes.

- g Can you improve on equipment selection/maintenance? No
- h Could you install better insulation? No
- i Can you re-circulate warm/cold air? Recirculation units installed.
- j Can you recycle process water? Yes - Wash water channelled to foul water reservoir.
- k Could pre-mixed feed be purchased? Yes – pre-mixed feed purchased

We have carried out a review of our energy policy and consider that the measures taken are in accordance with BAT and How to Comply and therefore no further action is necessary at this time.

**Waste Action Plan**

<b>A</b> <b>Waste Stream</b>	<b>B</b> <b>Can you avoid producing it?</b> <b>Yes/No</b>	<b>C</b> <b>Can you reduce the amount?</b> <b>Yes/No</b>	<b>D</b> <b>Can it be recovered, reused or recycled?</b> <b>Yes/No</b>	<b>E</b> <b>If disposed, have you complied with Legislation?</b> <b>Yes/No</b>	<b>F</b> <b>Are there any changes you can make?</b> <b>Yes/No</b>
Pesticides: concentrates likely to be hazardous, concentrates less so.	No	No	No	Yes	None
Feed residues: spilt feeds are non-hazardous.	No	Yes	Yes	Yes	Ensure spillages kept to a minimum.
Veterinary products: unused medicines, syringes, aerosols, disposable gloves, dressings could all be hazardous.	No	No	Disposed of in skip for removal by appropriate licensed waste contractor	Yes	None
Packaging: oil containers, smoke canisters, pesticide containers, animal health packaging – all potentially hazardous.	No	No	Disposed of in skip for removal by appropriate licensed waste contractor	Yes	None
Building residues: cement, bricks, metal, scrap wood, fencing wires. Hazardous waste removed by licenced contractor.	No	No	Disposed of in skip for removal by appropriate licensed waste contractor	Yes	None

<b>A Waste Stream</b>	<b>B Can you avoid producing it? Yes/No</b>	<b>C Can you reduce the amount? Yes/No</b>	<b>D Can it be recovered, reused or recycled? Yes/No</b>	<b>E If disposed, have you complied with Legislation? Yes/No</b>	<b>F Are there any changes you can make? Yes/No</b>
Light bulbs: fluorescent and long-life are hazardous.	No	No	Disposed of in skip for removal by appropriate licensed waste contractor	Yes	None
Batteries: lead acid, dry cell and button, NiCad rechargeable are all hazardous; alkaline are non-hazardous.	No	No	Disposed of in skip for removal by appropriate licensed waste contractor	Yes	None
Liquid wastes: wash water tanks, water collected in bunds, wheel washes and footbaths.	No	No	Yes – stored in irrigation ponds for use on land	Yes	None
Tyres: non-hazardous	No	No	Disposed of in skip for removal by appropriate licensed waste contractor	Yes	None
Scrap metals: non hazardous unless they contain oils.			Disposed of in skip for removal by appropriate licensed waste contractor		None

<b>A Waste Stream</b>	<b>B Can you avoid producing it? Yes/No</b>	<b>C Can you reduce the amount? Yes/No</b>	<b>D Can it be recovered, reused or recycled? Yes/No</b>	<b>E If disposed, have you complied with Legislation? Yes/No</b>	<b>F Are there any changes you can make? Yes/No</b>
Oils and lubricants: all potentially hazardous	No	No	No	Yes	None

We have reviewed the Waste Action Plan and consider the measures taken to be in accordance with BAT and conform to How to Comply.

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**EPR/UP3532QH**  
**Doc 11 Ammonia Reduction Techniques**

**Method:**

Growing cycle reduced from 42 days to 35 days.

**Result:**

Smaller birds are produced which reduces total ammonia emissions.

Partial depletion:

Partial depletion before the end of the growing cycle reduces total ammonia emissions. For example, a shed of 30,000 broilers, 6,000 will be 'thinned out' before the end of the cycle.

Biomass boilers and the effect on litter:

3 biomass boilers currently heat the sheds, 2 at Grange Farm and 1 at Hall Farm. As a result of the sheds being heated in this way, the relative humidity (RH) is kept to around 45% and the moisture content of the litter is around 20-25%, thus reducing ammonia emissions.

Ventilation humidity control and the effect on litter:

The ammonia output of a broiler house will vary according to how well the ventilation system manages the litter quality. The key to litter quality is based on keeping the humidity level below 65% and preventing cold outside air dropping onto the floor of the shed, producing damp litter patches. Our systems allow RH levels to be controlled and recorded 24 hours a day. If relative humidity were to exceed 60% the heaters are activated on a timer system to warm the air in the house; an 11% rise in air temperature doubles the water capacity of the air and RH level is halved. The heated air then rises naturally to the roof. Our systems force this warm air back to floor level, which is then utilized to absorb any unwanted moisture at bird and litter level.

Ventilation inlet control:

The velocity of the incoming air and the thickness of the inlet opening are crucial to creating the correct air pattern and distribution. The velocity of the air at the inlets is directly related to the differential negative pressure caused by the level of fan extraction. The system monitors the differential pressure and controls the inlets according to the set pressure relevant for the building width and design. Proper airflow and direction is set up and calibrated by smoke tests carried out by the commissioning engineers.



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Doc 11 Ammonia Reduction Techniques**

- Insulation of buildings: The buildings are fully insulated and airtight to eliminate any possibility of cold air draughts causing damp litter.
- Feed: Dietary protein is reduced to lessen nitrogen excretion.
- Drinkers: The nipple drinkers have drip cups to prevent drips reaching the litter.