An Assessment using Dispersion and Deposition Modelling of the Impact of Airborne Emissions of Particulate Matter from the Proposed Poultry Houses at Pear Tree Hill Road, near Whaplode Drove, Spalding in Lincolnshire

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1. Introduction

AS Modelling & Data Ltd. has been instructed by Mr. James Whilding of Acorus Rural Property Services Ltd., on behalf of Mr. Stuart Adams of Holbeach Poultry Ltd/Bowler Adams LLP, to use computer modelling to assess the impact of dust emissions from the proposed broiler chicken rearing houses at Pear Tree Hill Road, Whaplode Drove, Spalding, Lincolnshire. PE12 0SL.

Emissions of particulate matter (PM) from the proposed poultry houses have been assessed and quantified based upon the Environment Agency's standard dust emission factors for broiler chickens, Defra research and peer reviewed scientific data. The PM emission rates have then been used as inputs to an atmospheric dispersion and deposition model which calculates exposure levels in the surrounding area.

This report is arranged in the following manner:

- Section 2 provides relevant details of the site and potentially sensitive receptors in the area.
- Section 3 provides some general information on PM; details of the method used to determine emission rates; relevant guidelines and legislation on exposure limits and where relevant, details of likely background levels of the pollutants.
- Section 4 provides some information about ADMS, the dispersion model used for this study and details the modelling procedure.
- Section 5 contains the results of the modelling.
- Section 6 provides a discussion of the results and conclusions.

2. Background Details

The site of the proposed poultry rearing houses at Pear Tree Hill Road is in an isolated rural area; the surrounding land is used almost exclusively for arable farming. The site is approximately 2.4 km to the east-south-east of the village of Moulton Chapel in Lincolnshire, at an altitude of around 3 m on level drained fenland.

Under the proposal, twelve new broiler chicken rearing houses would be constructed on land off Pear Tree Hill Road. The new poultry houses would provide accommodation for up to 552,120 birds. The new houses would be ventilated by uncapped high speed ridge mounted fans, each with a short chimney, with gable end fans for supplementary ventilation in hot weather. The chickens would be reared from day old chicks for a period of 38 days and houses would be empty for around 10 days at the end of each crop.

There are some residences, commercial properties and amenity areas in the area around the site. Excluding the proposed workers dwellings at the farm, the closest residential properties are at: Peartree Farm, approximately 410 m to the south; Falconer's Rest, approximately 450 m to the north-west and Shepherds Cottage, approximately 660 m to the north-east.

A map of the surrounding area is provided in Figure 1, the positions of the proposed poultry houses at Pear Tree Hill Farm are outlined in blue.

Figure 1. The area surrounding the site of the proposed poultry houses at Pear Tree Hill Road

3. Air Quality Legislation, Regulation, Background Levels & Emission Rates

3.1 Air Quality Strategy and Air Quality Standards Regulations

The current Air Quality Strategy was published under the 2022 to 2024 Sunak Conservative government. This document sets out a framework to enable local authorities to deliver for their communities and contribute to our long-term air quality goals. It fulfils the statutory requirement of the Environment Act 1995 as amended by the Environment Act 2021 to publish an Air Quality Strategy setting out air quality standards, objectives, and measures for improving ambient air quality every five years. It does not replicate or replace our other air quality guidance documents relevant to local authorities.

For the purposes of this assessment, the limit values set out in The Air Quality Standards Regulations 2010 which transpose into law the requirements of the European Directives 2008/50/EC and 2004/107/EC on ambient air quality are used. The relevant objectives levels (and Environmental Assessment Levels (EALs) for the purposes of environmental permitting) are shown in Table 1a.

3.2 Guidance on the Significance of the Impact of Emissions

Where comment on the significance of the impact of emissions is made in this report, it is based upon guidance contained in an Environmental Protection UK publication titled Land Use Planning & Development Control: Planning For Air Quality (January 2017). It should be noted, however, that the final judgment on significance is made by the local authority's air quality specialist. The definitions of impact of magnitude for changes in pollutant concentration as a percentage of the assessment level and predicted concentration for an annual mean are provided in Table 1b.

Table 1a. Air Quality Standards Regulations 2010 - objectives levels

Pollutant	Air Quality Objective Concentration	Averaging period
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	Daily mean
	40 µg/m^3	Annual mean

Table 1b. Air quality impact descriptors for changes to annual mean concentrations

Average concentration (as percentage of Predicted Environmental Concentration)	Change in concentration (Process Contribution as percentage of Environmental Assessment Level)			
	<1	>=1 and <5	>=5 and <10	>10
<75	Negligible	Negligible	Slight	Moderate
>=75 to <95	Negligible	Slight	Moderate	Moderate
>=95 to <103	Slight	Moderate	Moderate	Substantial
>=103 to <110	Moderate	Moderate	Substantial	Substantial
>=110	Moderate	Substantial	Substantial	Substantial

3.3 Background concentrations of PM_{10}

The background PM_{10} concentrations used in this report are obtained from the Defra website, Local Air Quality Management (LAQM) support pages. Details of the methods used to drive these background concentrations are described in the AEA report titled “UK modelling under the Air Quality Directive (2008/50/EC) for 2010 covering the following air quality pollutants: SO_2, NO_X, NO_2, PM_{10}, $PM_{2.5}$, lead, benzene, CO, and ozone”.

The background concentrations of PM_{10} are provided in Table 2. This table contains concentrations for the centroid of the 1 km Ordnance Survey grid squares around the farm.

Table 2. Background PM_{10} concentrations

PM_{10} concentration 2024 (µg/m^3)					
OS easting & OS northing	530500	531500	532500	533500	534500
319500	14.835	14.221	14.949	14.933	14.336
318500	15.034	14.995	14.978	14.779	14.845
317500	15.031	15.013	14.993	14.986	14.917
316500	15.038	15.021	15.008	14.558	14.674
315500	15.049	14.973	15.003	15.009	14.553

3.4 Dust and acceptable levels

The phrase "acceptable levels" can be quite a controversial term, in that what is deemed acceptable to one person may not be thought of as acceptable by another. In this context, the term "acceptable level" of dust is used in reference to widely established practice or standards.

Statutory air quality data for suspended particulate matter exist in the UK (see Section 3.1); however, their applicability to other dusts is questionable as they were originally developed for airborne combustion by-products. No such statutory limits for nuisance dust exist for the UK.

The public response to what constitutes "nuisance" is reported by several authors (citations not provided in source) in respect of background and additional fugitive deposited dust levels, based on the various units of soiling; a summary of these findings is provided in Table 3. The wide range of values and subjective descriptions used to define "acceptable" nuisance dust deposition or soiling, together with the fact that complaints are often received well below these levels, demonstrates the urgent requirement for an empirical standard to be adopted, based on the central feature of nuisance dust, i.e. as a visible effect. This should be differentiated from the important, but unrelated, monitoring of health-related particulates as the airborne concentration of a size-related fraction (Sustainable Aggregates, information gateway).

Table 3. Public response levels related to deposition rates

Public Response	Typical Situation	Measure of soiling (mg/m³)
	Rural	2.38
	Suburban/small town	4.76
Noticeable		47.6
	Urban	71.5 - 95.3
Possible complaint	Rural summer-time	119.1
Objectionable		166.8
	Industrial	190.6 - 238.2
Probable complaint		476.4
Serious complaint		1191.1

3.5 Quantification of dust emission rate, particle size distribution, settling velocity and deposition velocity

The total dust emission rate used is 0.1 kg/bird/year, which is the Environment Agency's standard emission rate for broiler chickens. Particle size distribution and mass fraction are derived from figures in Defra research. Settling velocity and deposition velocity are calculated by using Stokes Equation and particle densities from Defra Research. For modelling purposes particles were divided in 5 classes which are approximately $PM_{2.5}$, PM_{10}, PM_{20}, PM_{30}, PM_{40} & PM_{50}. Details are summarised in Table 4.

Table 4. Particle size distribution, mass fraction, settling velocity and deposition velocity

Particle size range (µm)	Average particle size (µm)	Mass fraction	Average density (g/cm³)	Settling & Deposition velocity (m/s)
1-6	3.5	0.42	5.75	0.002213
7-13	10.0	0.20	2.91	0.007524
14-25	19.5	0.18	2.27	0.025817
26-36	31.0	0.11	1.99	0.058190
37-50	43.5	0.09	1.68	0.096512

3.6 Choice of receptors

Predicted pollutant levels are calculated at discrete receptor points by the dispersion model. The choice of where these receptors are defined is based upon guidance from the English Environment Agency's H1: Environmental risk assessment for permits and its technical annexes, specifically Annex A - Amenity & accident risk from installations and waste activities (note: now withdrawn). More specific guidance on the choice of receptors is available in Environmental Protection UK publication titled Development Control: Planning For Air Quality (2010 Update). The descriptions from Development Control: Planning For Air Quality are reproduced in Table 5.

Table 5. Choice of receptors (Development Control: Planning For Air Quality)

Averaging period of objective	Where the objective should apply	Where the objective should not generally apply
Annual	All locations where members of the public might be regularly exposed. Building facades, residential properties, schools, hospitals, care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
8 hours to 24 hours	All locations where the annual mean objectives would apply. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1 hour	All locations where the annual mean and 24 and 8-hour mean objectives would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend one hour or more. Any outdoor locations at which the public may be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15 minutes	All locations where members of the public might reasonably be expected to spend a period of 15 minutes or longer.	

4. The Atmospheric Dispersion Modelling System (ADMS) and model parameters

The Atmospheric Dispersion Modelling System (ADMS) ADMS 6 is a new generation Gaussian plume air dispersion model, which means that the atmospheric boundary layer properties are characterised by two parameters; the boundary layer depth and the Monin-Obukhov length rather than in terms of the single parameter Pasquill-Gifford class.

Dispersion under convective meteorological conditions uses a skewed Gaussian concentration distribution (shown by validation studies to be a better representation than a symmetrical Gaussian expression).

ADMS has a number of model options that include: dry and wet deposition; NO_x chemistry; impacts of hills, variable roughness, buildings and coastlines; puffs; fluctuations; odours; radioactivity decay (and γ-ray dose); condensed plume visibility; time varying sources and inclusion of background concentrations.

ADMS has an in-built meteorological pre-processor that allows flexible input of meteorological data both standard and more specialist. Hourly sequential and statistical data can be processed and all input and output meteorological variables are written to a file after processing.

The user defines the pollutant, the averaging time (which may be an annual average or a shorter period), which percentiles and exceedance values to calculate, whether a rolling average is required or not and the output units. The output options are designed to be flexible to cater for the variety of air quality limits, which can vary from country to country and are subject to revision.

4.1 Meteorological data

Computer modelling of dispersion requires hourly sequential meteorological data and to provide robust statistics the record should be of a suitable length; preferably four years or longer.

The meteorological data used in this study is obtained from assimilation and short term forecast fields of the Numerical Weather Prediction (NWP) system known as the Global Forecast System (GFS)[1].

Prior to April 2019 the GFS was a spectral model, post April 2019 the physics are discrete. The physics/dynamics model has a resolution or had an equivalent resolution of approximately 7 km over the UK; terrain is understood to be resolved at a resolution of approximately 2 km, with sub-7 km terrain effects parameterised. Site specific data may be extrapolated from nearby archive grid points or a most representative grid point chosen. The GFS resolution adequately captures major topographical features and the broad-scale characteristics of the weather over the UK. Smaller scale topological features may be included in the dispersion modelling by using the flow field module of ADMS (FLOWSTAR[2]). The use of NWP data has advantages over traditional meteorological records because:

- Calm periods in traditional observational records may be over represented, this is because the instrumentation used may not record wind speeds below approximately 0.5 m/s and start up wind speeds may be greater than 1.0 m/s. In NWP data, the wind speed is continuous down to 0.0 m/s, allowing the calms module of ADMS to function correctly.

- Traditional records may include very local deviations from the broad-scale wind flow that would not necessarily be representative of the site being modelled; these deviations are difficult to identify and remove from a meteorological record. Conversely, local effects at the site being modelled are relatively easy to impose on the broad-scale flow and provided horizontal resolution is not too great, the meteorological records from NWP data may be expected to represent well the broad-scale flow.

- Information on the state of the atmosphere above ground level which would otherwise be estimated by the meteorological pre-processor may be included explicitly.

A wind rose showing the distribution of wind speeds and directions in the GFS derived data is shown in Figure 2a. Wind speeds are modified by the treatment of roughness lengths (see Section 4.7). The roughness length modified wind rose for Pear Tree Hill Farm is shown in Figure 2b. The resolution of the wind field within ADMS is 100 m.

1. The GFS data used is derived from the high resolution operational GFS datasets, the data is not obtained from the lower resolution (0.5 degree) long-term archive.
2. Note that FLOWSTAR requirements are for meteorological data representative of the upwind flow over the modelling domain and that single site meteorological data (observational or from high resolution modelled data) that is representative of the application site is not generally suitable (personal correspondence: CERC 2019 and UK Met O 2015). If data are deemed representative of a particular application site, either wholly or partially, then these data cannot also be representative of the upstream flow over the modelling domain. Furthermore, it would be extremely poor practice to use such data as the boundary conditions for a flow-solver, such as FLOWSTAR.
3. When modelling complex terrain with ADMS, by default, the minimum turbulence length has 0.1 m added to the flat terrain value (calculated from the Monin-Obukhov length). Whilst this might be appropriate over hill/mountain tops in terrain with slopes > 1:10 (and quite possibly only in certain wind directions) in lesser terrain it introduces model behaviour that is not desirable where FLOWSTAR is simply being used to modify the upwind

flow. Specifically, the parameter sigma z of the Gaussian plume model is overly constrained, which for elevated point sources emissions, may on occasion cause over prediction of ground level concentrations in stable weather conditions and light winds (Steven R. Hanna & Biswanath Chowdhury, 2013), conversely for low level emission sources, this will cause gross under prediction. Note that this becomes particularly important overnight and if calm and light wind conditions are not being ignored, as they often are when using traditional observational meteorological datasets. To reduce this behaviour, where terrain is modelled, AS Modelling & Data Ltd. have set a minimum turbulence length of 0.025 m in ADMS. This approximates the normal behaviour of ADMS with flat terrain.

Figure 2a. The wind rose. Raw GFS derived data for 52.737 N, 0.039 W, 2020-2023

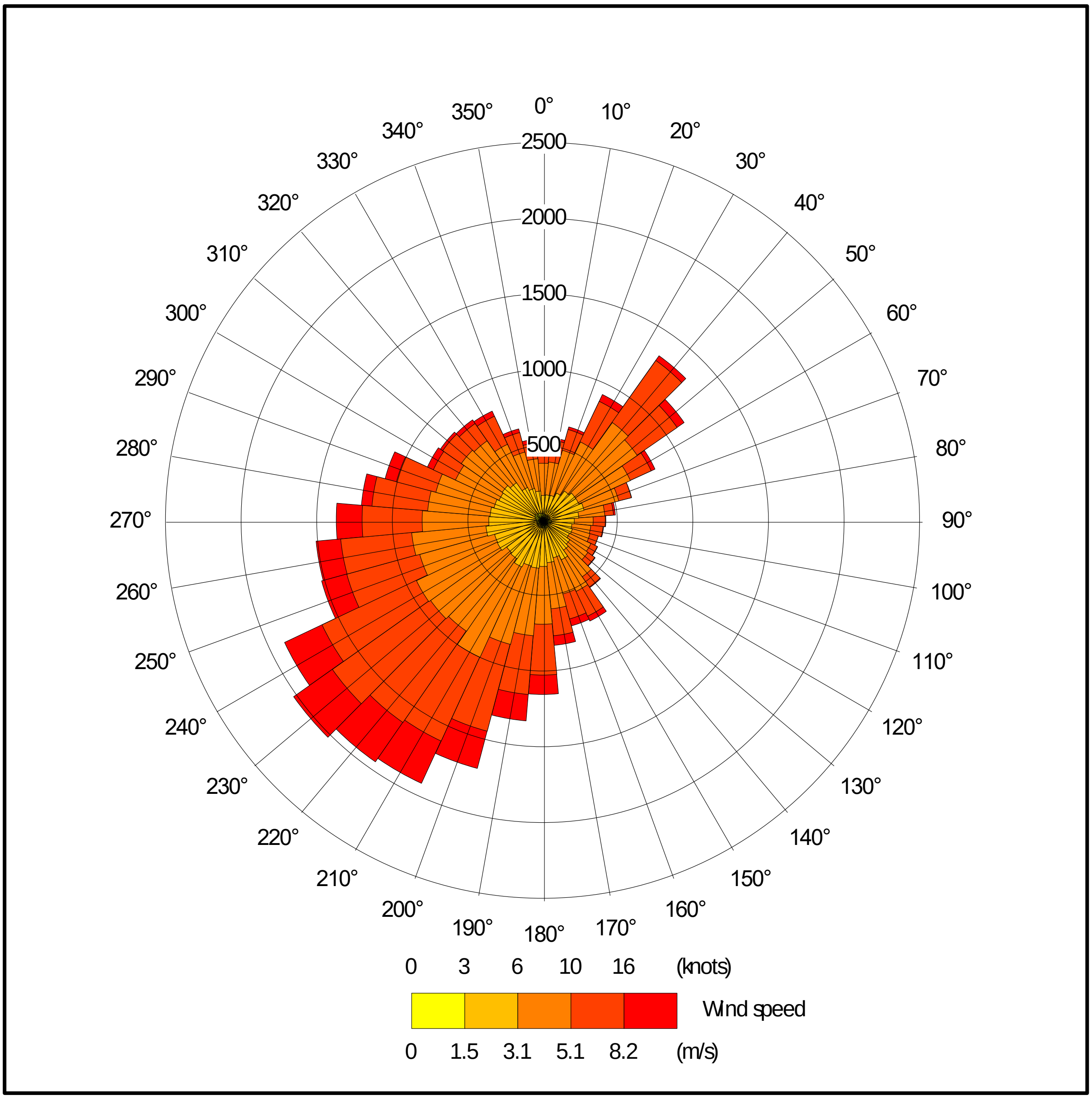
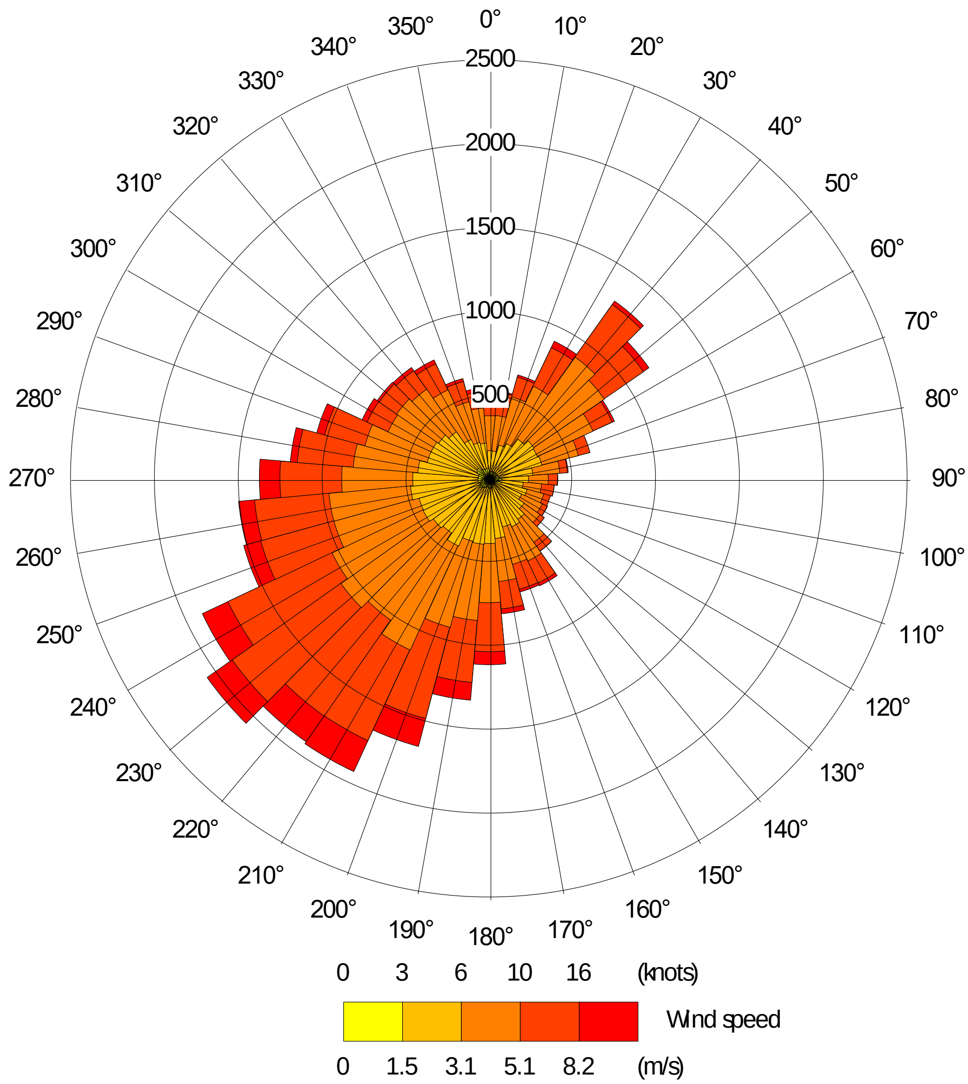


Figure 2b. The wind rose. modified GFS derived data for NGR 348100, 444100, 2020-2023



4.2 Emission sources

Emissions from the chimneys of the capped fans and uncapped high-speed ridge fans that would be used for the ventilation of the poultry houses are represented by three point sources per house within ADMS (H1 to H12; 1, 2 & 3).

Emissions from the gable end fans that would be used to supplement the primary ventilation of the poultry houses have been represented by volume sources within ADMS (H1to6_GAB and H7to12_GAB).

The emissions from the gable end fans are assumed to be zero unless the ventilation requirement within the poultry houses, which is a function of the age/weight of the flock and ambient temperature, exceeds the capacity of the high-speed ridge fans. In this case, as a precautionary measure, it is assumed that gable end fans provide 50% of the ventilation whenever ambient temperature exceeds 24 Celsius. It should be noted that particularly with 30 kg/m^2 maximum stocking densities, gable end fans would be used less frequently.

Details of the point source parameters are shown in Table 6a and details of the volume source parameters are shown in Table 6b. Note that for each particle class the baseline emission rates in Tables 6a and 6b are multiplied by the mass fractions given in Table 4. The positions of the emission sources used are shown in Figure 3 (the point sources are marked by green circles and the volume sources are marked by red shaded rectangles).

Table 6a. Point source parameters

Source ID	Height (m)	Diameter (m)	Efflux velocity (m/s)	Emission temperature (˚C)	Baseline Emission rate per source (g/s)
H1 to H6 1, 2 & 3	7.0	0.8	11	Variable [1]	0.048599 [2]
H7 to H12 1, 2 & 3	7.0	0.8	11	Variable [1]	0.048599 [2]

Table 6b. Volume source parameters

Source ID	Length (m)	Width (m)	Depth (m)	Base height (m)	Emission temperature (°C)	Baseline Emission rate (g/s)
H1to6_GAB	184.0	10.0	3.0	1.5	Ambient	0.874781[3]
H7to12_GAB	184.0	10.0	3.0	1.5	Ambient	0.874781[3]

1. Dependent on ambient temperature.
2. Reduced by 50% when ambient temperature equals or exceeds 24 Celsius.
3. 50% of total emitted only when ambient temperature equals or exceeds 24 Celsius.

4.3 Modelled buildings

The structure of the poultry houses may affect the plumes from the point sources. Therefore, buildings are modelled within ADMS. The positions of the modelled buildings may be seen in Figure 3 (marked by blue rectangles).

4.4 Discrete receptors

Twenty-nine discrete receptors have been defined at a selection of nearby residences and commercial properties. The receptors are defined at 1.5 m above ground level within ADMS and their positions may be seen in Figure 4 (marked by enumerated pink rectangles).

4.5 The nested Cartesian grid

To produce the contour plots presented in Section 5 of this report, a nested Cartesian grid has been defined within ADMS. The grid receptors are defined at 1.5 m above ground level within ADMS. The positions of the grid receptors may be seen in Figure 4 (marked by green crosses).

4.6 Terrain data

Terrain height is not modelled, but surface roughness is modelled over a 6.4 km by 6.4km domain at 50m resolution. The resolution of the wind field over this domain is 100m.

4.7 Roughness Length

In this case, a spatially varying roughness length file has been defined, this is based upon the Defra Living Landscapes land use database. The GFS meteorological data is assumed to have a roughness length of 0.161 m (arithmetic average of the spatially varying roughness over the modelling domain). The sample of the central area of the spatially varying roughness length field is shown in Figure 5.

4.8 Settlement and deposition

Settlement and deposition velocity are considered in the modelling, see Table 4.

Figure 3. The positions of the modelled sources and buildings at Pear Tree Hill Road

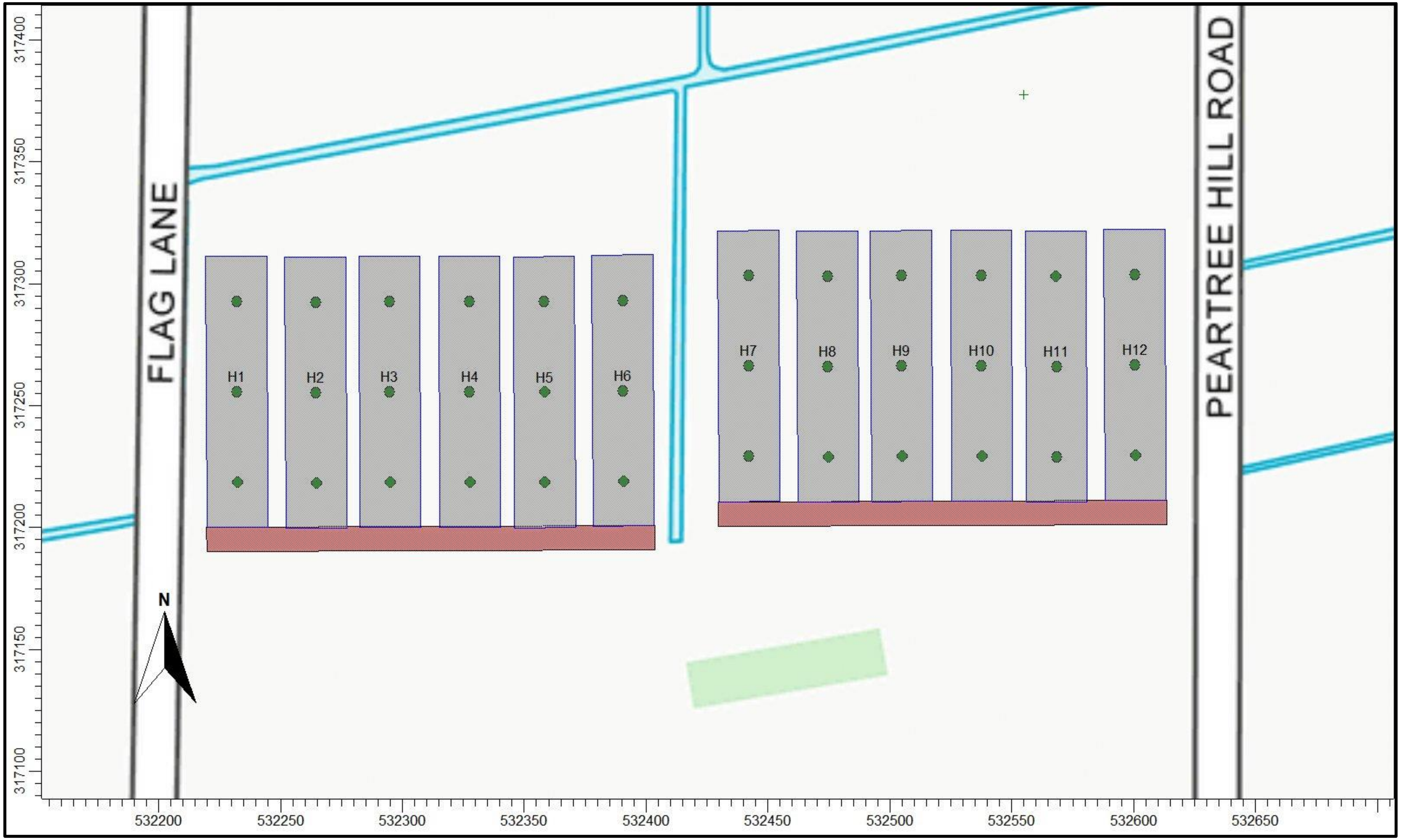


Figure 4. The nested Cartesian grid and the discrete receptors

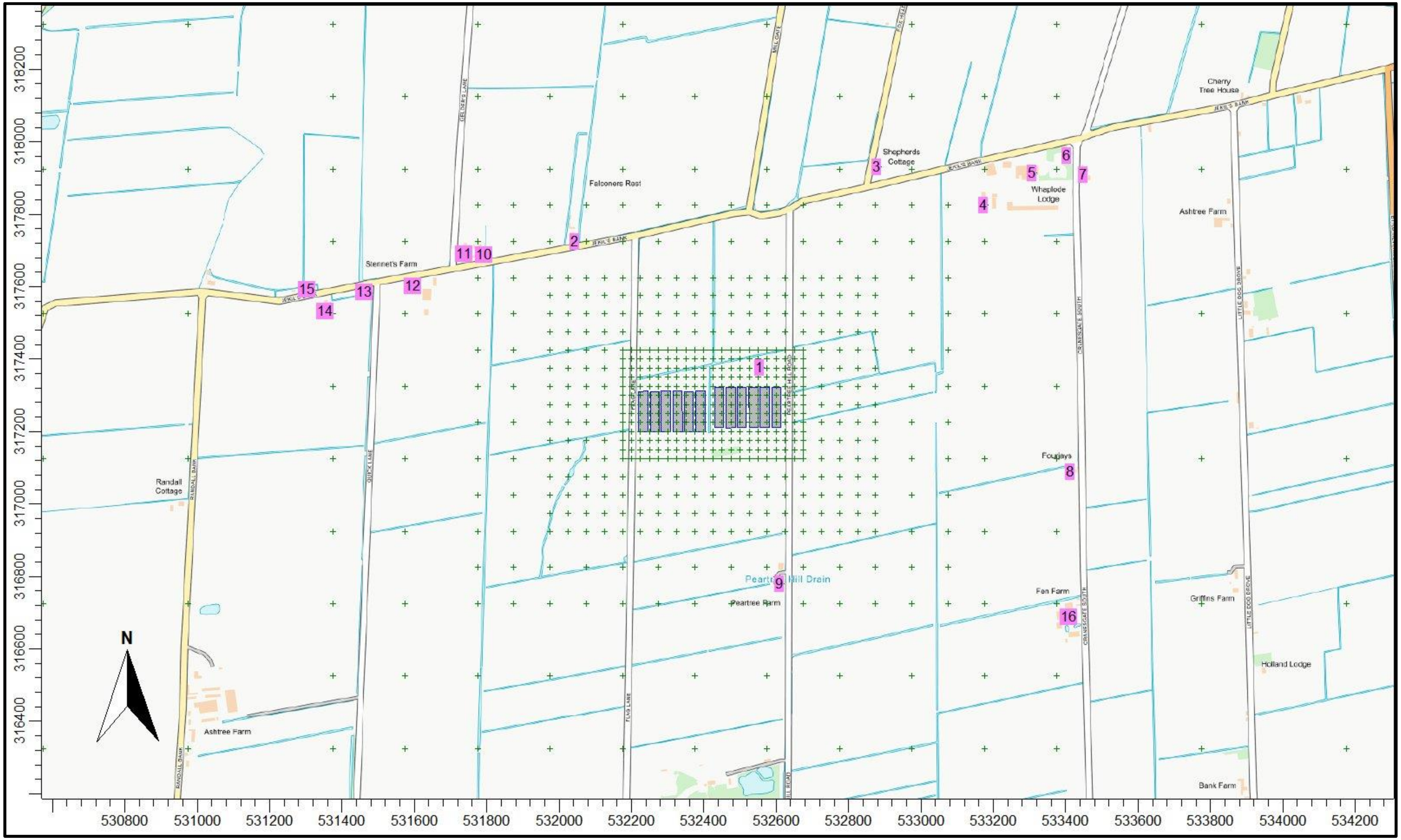


Figure 5. The spatially varying surface roughness field (central area)

5. Details of the Model Runs and Results

ADMS was run a total of four times, once for each year in the meteorological record, with the calms module of ADMS included.

A summary of results, at the discrete receptors, of the modelling of PM_{10} emissions are provided in Table 7 (maximum annual mean PM_{10} concentration) and Table 8 (maximum 24 hour mean PM_{10} concentration). For the short-term objectives (24 hour averaging period) the background concentration is doubled. The abbreviations used; EAL; PC and PEC, mean Environmental Assessment Level; Process Contribution and Predicted Environmental Concentration, respectively.

A summary of average daily total dust deposition figures is provided in Table 9.

A contour plot of the process contributions to maximum annual mean PM_{10} concentration is provided in Figure 6. A contour plot of the process contribution to maximum 24 hour mean PM_{10} concentration is provided in Figure 7. A contour plot of the process contribution to average daily dust deposition is provided in Figure 8.

Table 7. Maximum annual mean PM_{10} concentration at the discrete receptors

Receptor Number	X(m)	Y(m)	Maximum annual mean PM_{10} concentration (μg/m^3)							
			PC	Background	EAL	PEC	PC as %age of EAL	%age change from background levels	Air quality impact descriptors	Exceedances of EAL predicted
Maximum	532525	317275	5.50	14.99	40.0	20.5	13.7	36.7	**Moderate**	No
1	532555	317377	3.16	14.99	40.0	18.2	7.9	21.1	**Slight**	No
2	532042	317724	0.34	14.99	40.0	15.3	0.9	2.3	Negligible	No
3	532878	317930	0.40	14.99	40.0	15.4	1.0	2.7	Negligible	No
4	533173	317825	0.34	14.99	40.0	15.3	0.9	2.3	Negligible	No
5	533308	317913	0.27	14.99	40.0	15.3	0.7	1.8	Negligible	No
6	533402	317961	0.23	14.99	40.0	15.2	0.6	1.6	Negligible	No
7	533448	317909	0.23	14.99	40.0	15.2	0.6	1.6	Negligible	No
8	533411	317090	0.26	14.99	40.0	15.2	0.6	1.7	Negligible	No
9	532610	316781	0.39	15.01	40.0	15.4	1.0	2.6	Negligible	No
10	531791	317690	0.20	15.01	40.0	15.2	0.5	1.3	Negligible	No
11	531736	317692	0.18	15.01	40.0	15.2	0.4	1.2	Negligible	No
12	531596	317603	0.15	15.01	40.0	15.2	0.4	1.0	Negligible	No
13	531461	317587	0.13	15.01	40.0	15.1	0.3	0.8	Negligible	No
14	531353	317534	0.11	15.01	40.0	15.1	0.3	0.7	Negligible	No
15	531304	317592	0.10	15.01	40.0	15.1	0.3	0.7	Negligible	No
16	533410	316689	0.19	14.56	40.0	14.7	0.5	1.3	Negligible	No

Table 8. Maximum 24 hour mean PM_{10} concentration at the discrete receptors

Receptor Number	X(m)	Y(m)	Maximum 24 hour mean PM_{10} concentration (μg/m^3)							
			PC	Background	EAL	PEC	PC as %age of EAL	%age change from background levels	Air quality impact descriptors	Exceedances of EAL predicted
Maximum	532250	317200	64.95	30.0	50.0	94.9	**129.9**	216.6	-	3.0
1	532555	317377	10.47	30.0	50.0	40.5	20.9	34.9	-	0.0
2	532042	317724	5.32	30.0	50.0	35.3	10.6	17.7	-	0.0
3	532878	317930	5.15	30.0	50.0	35.1	10.3	17.2	-	0.0
4	533173	317825	4.67	30.0	50.0	34.6	9.3	15.6	-	0.0
5	533308	317913	3.94	30.0	50.0	33.9	7.9	13.1	-	0.0
6	533402	317961	3.62	30.0	50.0	33.6	7.2	12.1	-	0.0
7	533448	317909	3.77	30.0	50.0	33.7	7.5	12.6	-	0.0
8	533411	317090	4.70	30.0	50.0	34.7	9.4	15.7	-	0.0
9	532610	316781	4.41	30.0	50.0	34.4	8.8	14.7	-	0.0
10	531791	317690	3.96	30.0	50.0	34.0	7.9	13.2	-	0.0
11	531736	317692	3.91	30.0	50.0	33.9	7.8	13.0	-	0.0
12	531596	317603	4.14	30.0	50.0	34.2	8.3	13.8	-	0.0
13	531461	317587	3.33	30.0	50.0	33.4	6.7	11.1	-	0.0
14	531353	317534	2.63	30.0	50.0	32.7	5.3	8.8	-	0.0
15	531304	317592	2.62	30.0	50.0	32.6	5.2	8.7	-	0.0
16	533410	316689	4.92	29.1	50.0	34.0	9.8	16.9	-	0.0

Table 9. Average daily total dust deposition (sum of all classes) at the discrete receptors

Receptor Number	X(m)	Y(m)	Mean 24 hour dust deposition (mg/m^2)
			PC
1	532555	317377	**53.23**
2	532042	317724	4.55
3	532878	317930	4.98
4	533173	317825	4.06
5	533308	317913	3.01
6	533402	317961	2.53
7	533448	317909	2.45
8	533411	317090	2.71
9	532610	316781	5.91
10	531791	317690	2.28
11	531736	317692	1.97
12	531596	317603	1.52
13	531461	317587	1.14
14	531353	317534	0.92
15	531304	317592	0.84
16	533410	316689	1.72
17	532175	317125	25.30
18	532200	317125	27.54
19	532225	317125	29.18
20	532250	317125	30.51
21	532275	317125	31.82
22	532300	317125	32.90
23	532325	317125	33.80
24	532350	317125	34.43
25	532375	317125	34.83
26	532400	317125	34.99
27	532425	317125	34.98
28	532450	317125	34.69
29	532475	317125	33.80

Figure 6. Maximum annual mean PM_{10} concentration (process contribution)

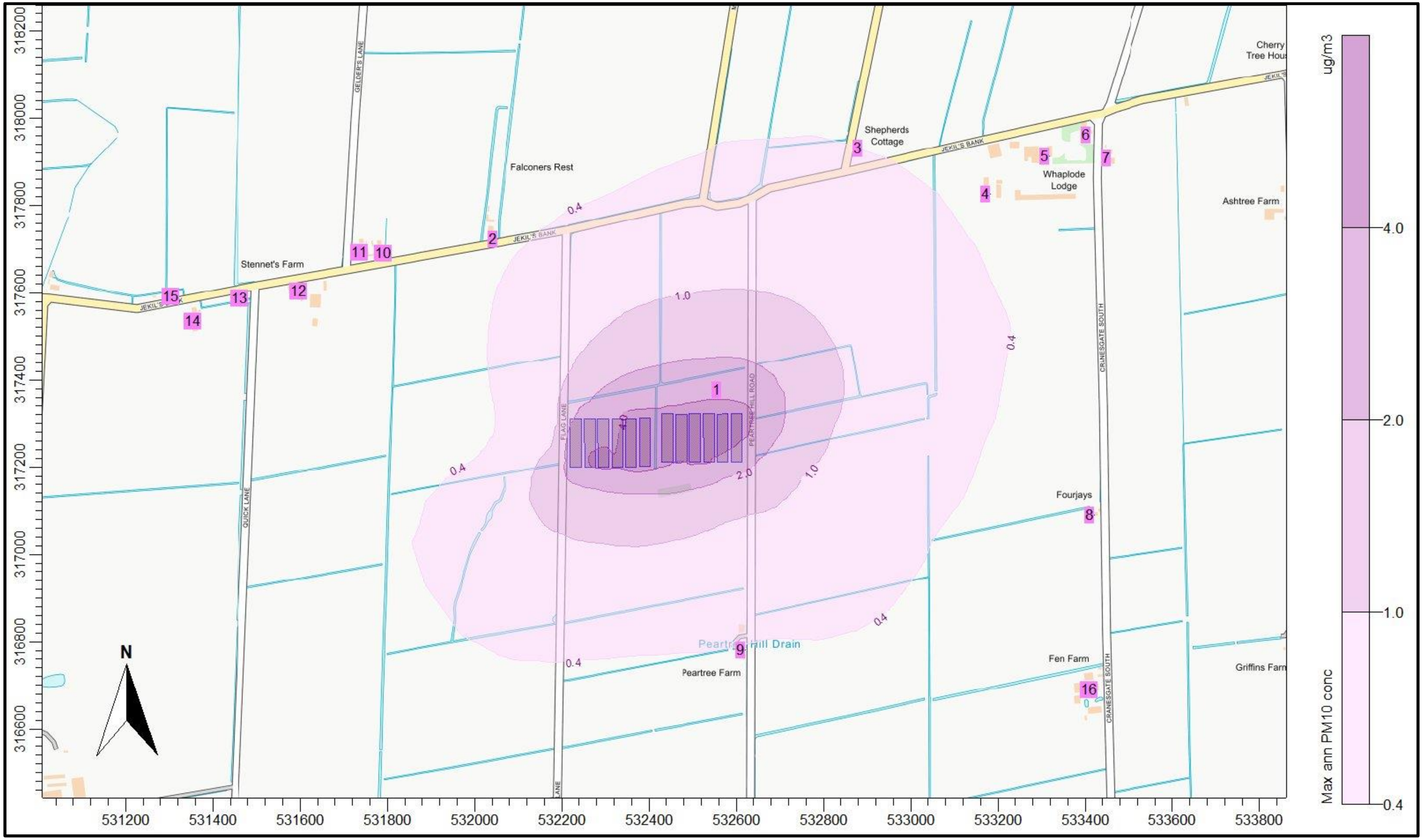


Figure 7. Maximum 24 hour mean PM_{10} concentration (process contribution)

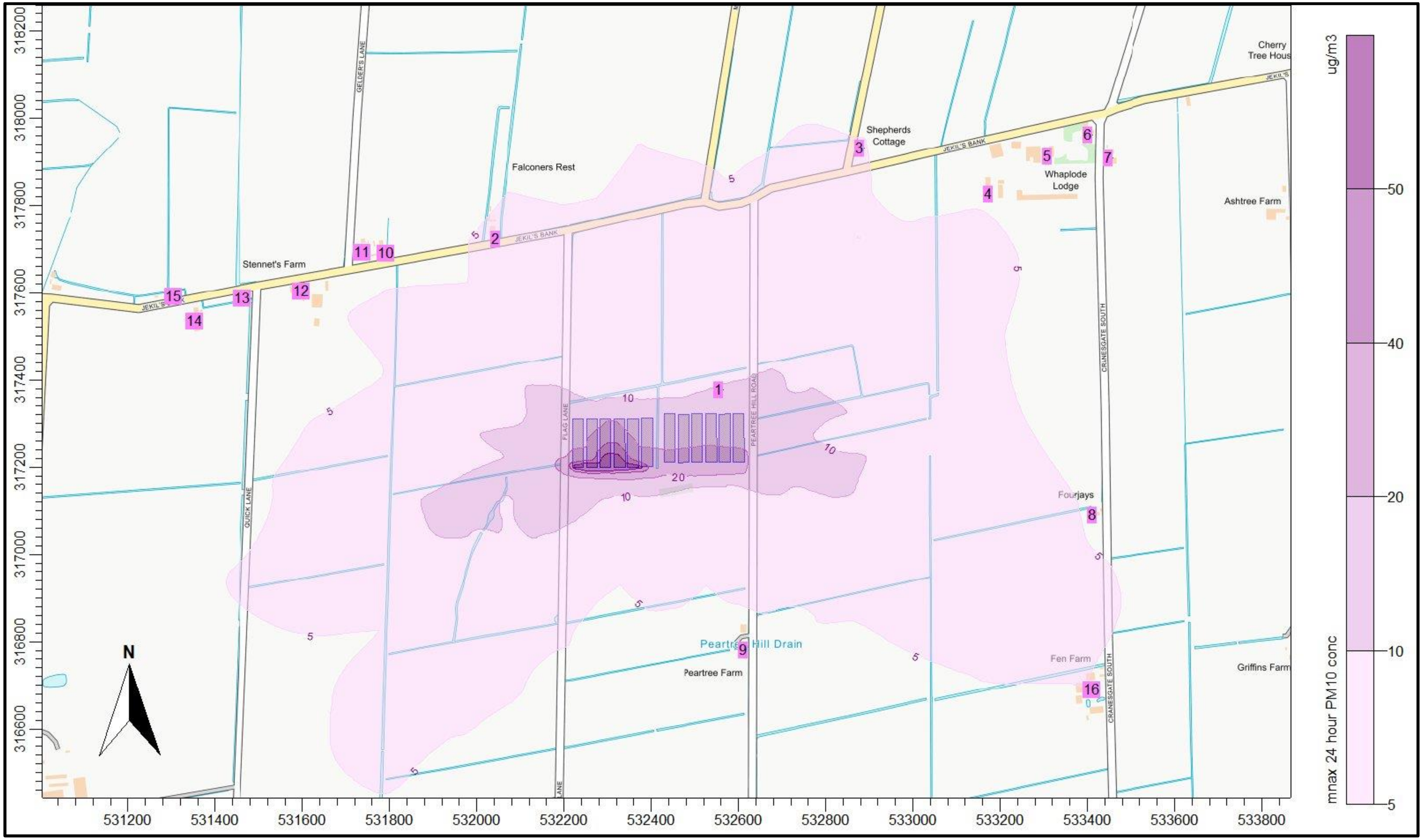
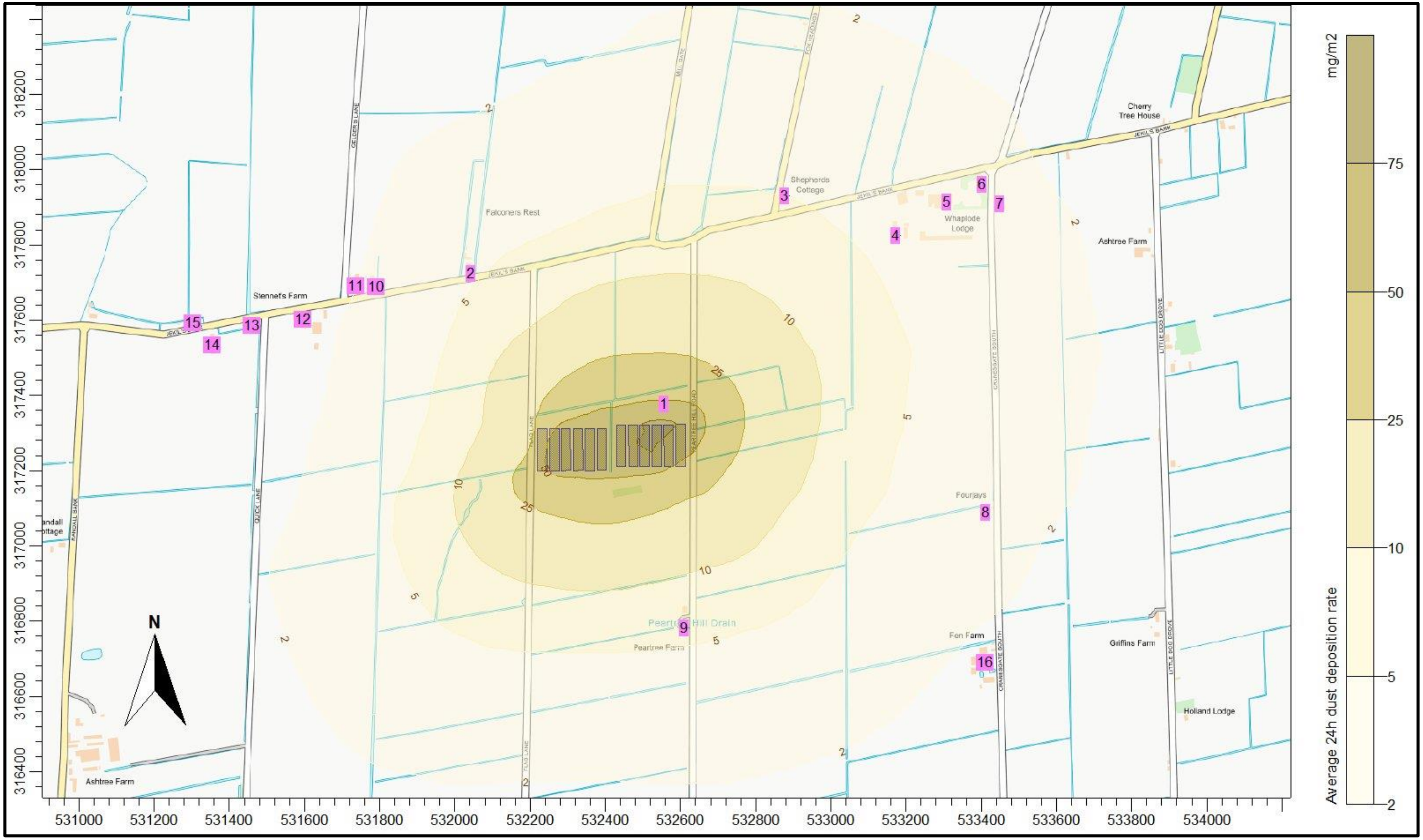


Figure 8. Daily total dust deposition rate (process contribution)



6. Summary and Conclusions

AS Modelling & Data Ltd. has been instructed by Mr. James Whilding of Acorus Rural Property Services Ltd., on behalf of Mr. Stuart Adams of Holbeach Poultry Ltd/Bowler Adams LLP, to use computer modelling to assess the impact of dust emissions from the proposed broiler chicken rearing houses at Pear Tree Hill Road, Whaplode Drove, Spalding, Lincolnshire. PE12 0SL.

Emissions of PM from the proposed poultry houses have been assessed and quantified based upon the Environment Agency's standard dust emission factors for broiler chickens, Defra research and peer reviewed scientific data. The PM emission rates have then been used as inputs to an atmospheric dispersion and deposition model which calculates exposure levels in the surrounding area.

It should be noted that PM emissions are likely to be rather variable and that steady continuous emission have been modelled. Therefore, although the absolute values of the annual mean statistics may have some validity, short term statistics should be used only comparatively.

Annual mean PM_{10}

There are no predicted exceedances of the EAL of 40 µg/m^3 for annual mean.

The air quality impact descriptor at the proposed workers residences is Slight and at all other nearby residences/amenity areas/commercial premises is Negligible.

24 hour mean PM_{10}

Notwithstanding the comments above about the validity of the short term statistics.

There are a maximum of three exceedances of the EAL of 50 µg/m^3 for PM_{10} predicted (at NGR 532525, 317275 which is in very close proximity to the gable end fans). Note that 35 exceedances may be permitted.

At receptors 1, 2 and 3 (the proposed farm workers residences, Falconer's rest and Shepherds Cottage) the predicted PC exceeds 10% of the EAL, but is within normally acceptable thresholds; at all other nearby residences/amenity areas/commercial premises the PC is less than 10% of the EAL and therefore would normally be deemed insignificant.

Total dust deposition

Notwithstanding the comments above about the validity of the short term statistics, the modelling predicts dust accumulation would be below noticeable rates at all residences/amenity areas/commercial premises, except the proposed farm workers residences.

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