Hill Farm

Report Title:	**Odour Impact Assessment**
Issue Date:	**August 2024**
Report Reference:	**R218-OIA-F1**

Submitted to:
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1 Introduction

1.1 General

This document provides an odour impacts assessment for the Hill Farm cattle rearing facility, located at Holmrook, Cumbria. The assessment has been requested by the council as a supporting assessment in their determination of a retrospective planning application for the change of use of the farm from a dairy farm to a beef cattle rearing farm.

1.2 Document Scope & Objectives

This odour assessment document looks to address:

- The farm operations and history.
- The local environment, including nearby receptors and odour sources
- Operations at site that may generate odours
- Site odour mitigation measures
- Predicted residual impacts.

1.3 Outline Description

1.3.1 Operations

Hill Farm operates a beef cattle rearing facility. Ancillary operations related to the facility's activities include animal food handling and storage, slurry/waste handling and storage and effluent discharge.

1.3.2 Location

The facility is located in Holmrook in a rural area of West Cumbria. Agricultural land is located to 3 sides with the North-east neighbours comprising residential properties. A detailed sensitive receptor drawing and table is provided in further below.

1.3.3 Operating Hours

Animal husbandry takes place 24/7 and 365 days per year. Support functions such as feed preparation, waste removal, cleandown and livestock transfer occur typically 7am to 6pm over a 5 day week, 52 weeks of the year.

1.3.4 Permitting Requirements

The farm does not fall under the definition of intensive farming contained within the Environmental Permitting (England and Wales) Regulations SI 2016/1154 (as variously amended). As such the farm is not required to hold an environmental permit for its activities in the way that larger pig and poultry farms are. The lack of need for a permit reflects the intrinsically lower impacts associated with cattle compared to pigs and poultry.

1.3.5 Farm History

The farm has been farmed for over 100 years and was a dairy farm for a large proportion of that time. Approximately 15 years ago the use changed to a mixed dairy and beef facility. In 2021 the farm changed owners and changed to solely beef raising. It is this change of use that is the subject of the current planning application and this associated odour impact study.

1.4 Relevant Guidance Documents

Guidance is available from the Environment Agency on assessing odour impacts but it is focussed primarily towards sites operating under an environmental permit. Whilst these are not directly applicable to the farm here, they can be useful in providing context and background as well as supporting detail for the assessment. Key guidance that has relevance includes:

- Environment Agency Odour Management Plant Template, Final V2, 05/05/21
- EA risk assessment guidance: https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit;
- Environment Agency guidance, H4 Odour Management, March 2011;

The lack of a predictive assessment tool for planning purposes was recognised by the Institute of Air Quality Management. As a result they conducted a review of available resources and produced a document specifically aimed at providing a pragmatic approach to assessing potential odour impacts associated with planning applications. The guidance was published as "Guidance on the assessment of odour for planning, Version 1.1 - July 2018".

The IAQM document is the prime reference document for this odour impact assessment.

1.5 IAQM Approach Adopted

The IAQM assessment document adopts a refined source-pathway-receptor model using a matrix approach. The various elements and how they fit together to generate an overall odour risk evaluation are described below.

1.5.1 Source Odour Potential

Step 1 is to evaluate the odour release potential of possible odour sources. The Guidance suggests classifying the odour release potential as large, medium or small and gives criteria and examples by which the classification can be made. The criteria for making the assessment include the magnitude of the source, the tone/unpleasantness of the odour and any control or mitigation measures

	Large	**Medium**	**Small**
Magnitude	Larger Permitted processes of odorous nature or large STWs; materials usage hundreds of thousands of tonnes/m^3 per year; area sources of thousands of m^2. The compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known.	Smaller Permitted processes or small Sewage Treatment Works (STWs); materials usage thousands of tonnes/m^3 per year; area sources of hundreds of m^2 The compounds involved are moderately odorous.	Falls below Part B threshold; materials usage hundreds of tonnes/m^3 per year; area sources of tens m^2. The compounds involved are only mildly odorous, having relatively high ODTs where known.
Tone	Processes classed in H4 as "Most offensive"; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score	Processes classed in H4 as "Moderately offensive"; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score.	Processes classed as "Less offensive" in H4; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score.

	Large	**Medium**	**Small**
Control	Open air operation with no containment, reliance solely on good management techniques and best practice	Some mitigation measures in place, but significant residual odour remains.	Effective, tangible mitigation measures in place (e.g. BAT, BPM) leading to little or no residual odour.

The offensiveness classification in the EA Guidance H4 and referenced in IAQM Guidance is as follows

- Most Offensive - Processes involving decaying animal or fish remains; processes involving septic effluent or sludge; biological landfill odours
- Moderately Offensive - Intensive livestock rearing; fat frying (food processing); sugar beet processing; well aerated green waste composting
- Less Offensive- Brewery; confectionery; coffee

1.5.2 Pathway Effectiveness

The second step in the IAQM evaluation process is to address the effectiveness of the pathway from source to receptor. Again a matrix/table approach is proposed with pathways being designated highly effective, moderately effective and ineffective as in the tabulation below. Factors that are suggested as elements for consideration are distance to receptor, direction to the receptor (especially relative to prevailing or dominant winds) and dispersion/dilution effects.

	Highly Effective	**Moderately Effective**	**Ineffective**
Distance	Receptor is adjacent to the source/site; distance well below any official set-back distances	Receptor is local to the source	Receptor is remote from the source; distance exceeds any official set-back distances.
Direction	High frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of source with respect to prevailing wind)	-	Low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind).
Dispersion	Open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes	Releases are elevated, but compromised by building effects.	Releases are from high level (e.g. Stacks, or roof vents >3m above ridge height) and are not compromised by surrounding buildings

1.5.3 Exposure Risk

In the third step, the estimates of Source Odour Potential and the Pathway Effectiveness are considered together to predict the risk of odour exposure at the receptor location. These are rated negligible, low, medium and high as per the table below which is extracted from the guidance document.

		Source Odour Potential		
		Small	Medium	Large
Pathway Effectiveness	Highly effective pathway	Low Risk	Medium Risk	High Risk
	Moderately effective pathway	Negligible Risk	Low Risk	Medium Risk
	Ineffective pathway	Negligible Risk	Negligible Risk	Low Risk

1.5.4 Receptor

To give a full picture of the magnitude of odour impacts the guidance suggests that receptor sensitivity be applied to the exposure risk values. Receptor sensitivity is assessed as high, medium and low as per the criteria in the table below.

	Highly Sensitive	**Moderately Sensitive**	**Insensitive**
Amenity	Users` can reasonably expect enjoyment of a high level of amenity	Users` would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home	The enjoyment of amenity would not reasonably be expected
Exposure	The people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land	People wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	There is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land
Examples	Residential dwellings, hospitals, schools/education and tourist/cultural	Places of work, commercial/retail premises and playing/recreation fields	Industrial, farms, footpaths and roads

1.5.5 Overall Impact Assessment

The final stage is to estimate the effect of that odour impact on the exposed receptor, taking due account of its sensitivity, as addressed above. The odour effects may range from negligible, through slight adverse and moderate adverse, up to substantial adverse.

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

2 On-farm Controls

The on-farm control measures in place to minimise odour release and transmission are set out below. These controls feed into the risk assessment in subsequent sections. The controls are listed according to the stages of livestock management at the farm.

2.1 Incoming and Outgoing Animals

Livestock are moved on industry-standard HGVs or small livestock trailers. The number of trailers on site at any time is controlled and is generally no more than 2 to minimise odour risk. Livestock are unloaded as son as practicable after arrival at site and the trailer is dry swept and cleaned. Trailers for outgoing livestock are required to be clean on entry to the farm for both odour control and disease control purposes.

2.2 Livestock Holding

2.2.1 General

Livestock are housed in byres with concrete floors and deep straw bedding.

The bedding provides an effective means of absorption for ammonia etc odours associated with urine and manure. It is removed regularly and added to the midden pile prior to being taken off-site for recovery as a chemical fertiliser substitute.

Concrete floors allow for effective cleaning between cohorts of cattle. They are laid to fall to drainage channels to allow slurry and urine to be collected and pumped into the slurry tank.

2.2.2 Feeding

Feeding is with dry feeds to minimise the risk of spoilage odours associated with liquid feeds. There is minimal feeding with silage. Hay is sourced from different crop regimes to give a balance of nutrients and is supplemented by dry feed nuggets and pellets. In line with recent guidance for intensive livestock (BAT conclusions on intensive livestock (COMMISSION IMPLEMENTING DECISION (EU) 2017/302) feeds are balanced to minimise excess proteins and nitrogen intake which is known to reduce odour potential from slurry and manure.

Feed troughs and hay mangers are fitted to each byre to keep feed dry and separated from the floor and bedding.

2.2.3 Slurry/Manure

The sheds are swept clear on a regular basis to remove used bedding before it can degrade and generate significant odours.

Urine and slurry channels are flushed through with clean water on a daily basis to ensure there are no standing pools or blockages that could degrade and generate significant odours.

2.3 Waste/ABP

2.3.1 Casualty Animals

Casualty animals are removed from the farm as soon as possible. The farm has a call-off contract with local knacker and animal by-products premises to ensure that removal is carried out swiftly and in accordance with relevant Animal By-product regulations.

2.3.2 Midden

Used bedding is temporarily stored in a midden with side walls as is generally adopted as industry practice. As soon as the midden is full or almost full the material is loaded onto trailers to be taken for off-sit use as a fertiliser replacement.

2.3.3 Slurry

Slurry from the cattle housings and from the yards collects in a catchment pit from where it is pumped into the slurry holding tank. The slurry tank is not agitated which is in line with guidance on minimising odour generation and release. The lack of agitation ensures a crust forms on the top of the slurry which further minimise the potential for odour release. Pumped slurry is introduced into the tank below the surface crust to maintain the crust integrity.

3 Odour Risk

3.1 Sources

3.1.1 Magnitude

Permitting of cattle farms is not currently listed in the relevant regulations (Environmental Permitting); only intensive pig and intensive poultry rearing are listed. Nonetheless the thresholds for permitting can help in assessing the source magnitude. Pig farms are permitted when they contain places for more than 750 sows. Allowing for boars to service sows, weaners and growers on the farm this would equate typically to some 5000+ head of pigs. Hill Farm with 450-550 cattle would seem to fit in a category of "smaller permitted process".

The area over which the odour can be created is in the order of hundreds of square metres.

Overall the source magnitude is "**medium**".

3.1.2 Tone

Intensive livestock is specifically listed as having a medium odour unpleasantness tone.

Overall the odour tone is "**medium**".

3.1.3 Mitigation

Releases are at low level and there is no specific release point to enhance dispersion.

There is a degree of mitigation provided by the farm tailoring feed materials to those giving less odour and also by regular cleaning of the livestock areas.

Overall the odour mitigation is "**medium**".

3.1.4 Total

All three individual elements class as medium and therefore the overall odour source can be classed as **medium**.

3.2 Pathways

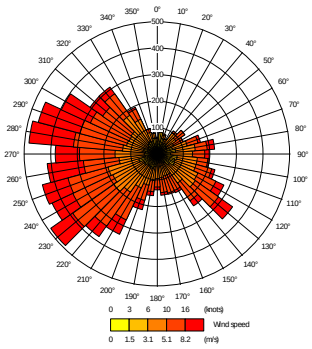
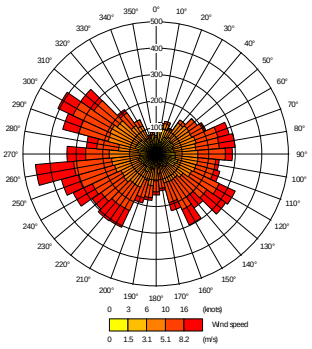
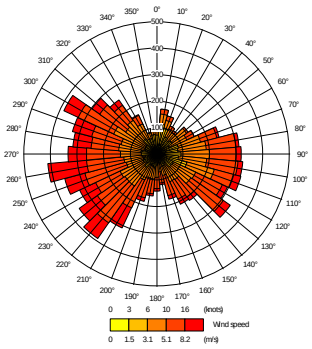
3.2.1 Distance

Receptors are local to the farm. This fits into the classification of a moderately effective pathway.

Overall the odour pathway distance is "**moderately effective**".

3.2.2 Direction

Wind rose data has been compiled for 3 recent years for which data is available. The closest station with good data availability is Walney Island. Hourly sequential data for 2017, 2018 and 2019 were purchased from Airpollution Services and used to generate the windroses set out below.

Wind Rose / Weather Data		
2017	2018	2019
		

The wind data shows a large preponderance of wind from a westerly direction with wind from the easterly direction being the next most significant. There is little historical data showing winds in the north-south axis. Whilst the east-west axis receives the majority of wind there is no clear higher frequency for either of these directions. As such the wind direction data supports a classification of moderately effective.

Overall the wind direction effect is "**moderately effective**".

3.2.3 Releases and Dispersion

Odour releases are generally at ground level which would class as highly effective in the absence of any mitigating effects. Mitigating effects at the farm include:

- Cattle are housed in typical byres. These have a roof covering and the end walls are generally solid, providing barriers to odour transmission. In addition, the byres are relatively close to each other and provide a degree of disruption to odour transmission.
- Slurry is stored in a standard slurry tank with an open top. The slurry is not agitated and a surface crust is allowed to develop which reduces odour release rates (the most recent BAT conclusions on intensive livestock - COMMISSION IMPLEMENTING DECISION (EU) 2017/302 - include as BAT Considerations allowing a natural crust to form and not agitating the slurry).

The mitigating effects in place mean that overall the dispersion effect is "**moderately effective**".

3.2.4 Total

All three individual elements class as moderately effective and therefore the overall odour source can be classed as **moderately effective**.

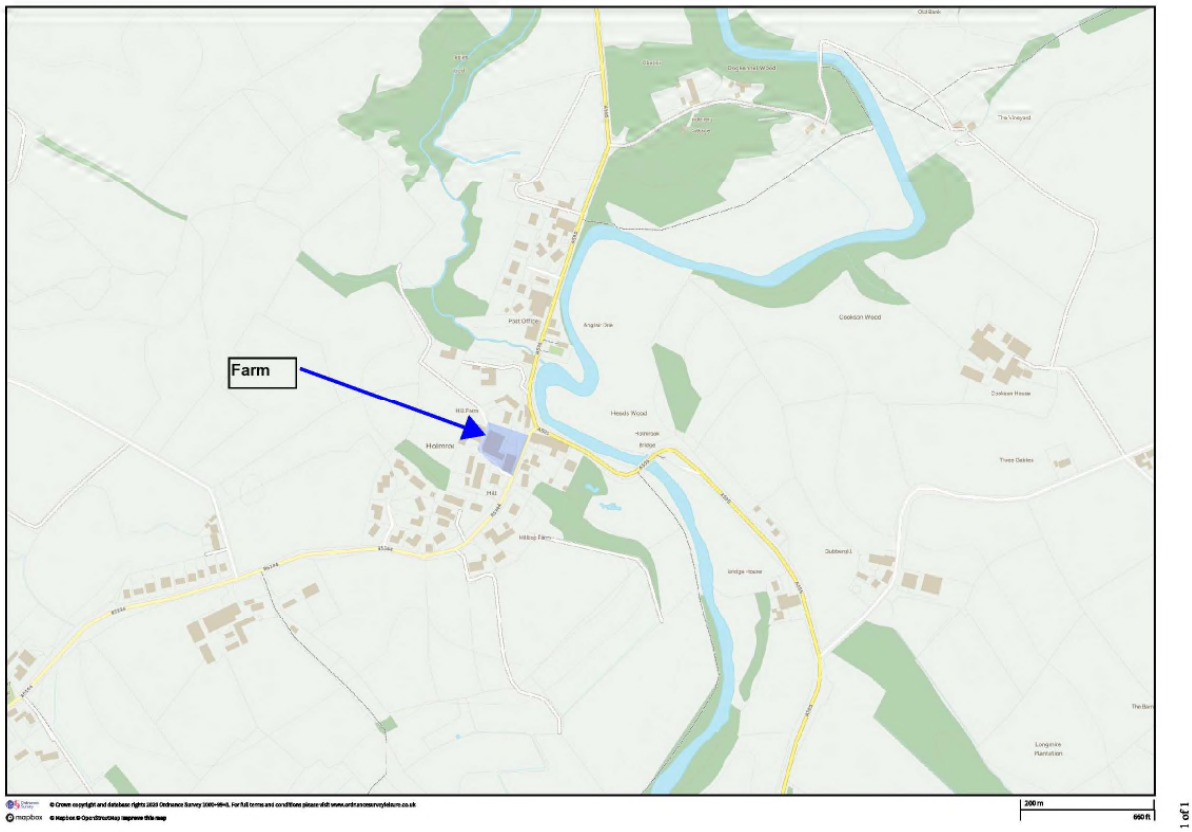
3.3 Overall Odour Risk

For a medium sized source with a moderately effective pathway the IAQM tabulation gives an overall exposure risk of **low**.

4 Receptor Identification

4.1 Location

The map below shows the site location.



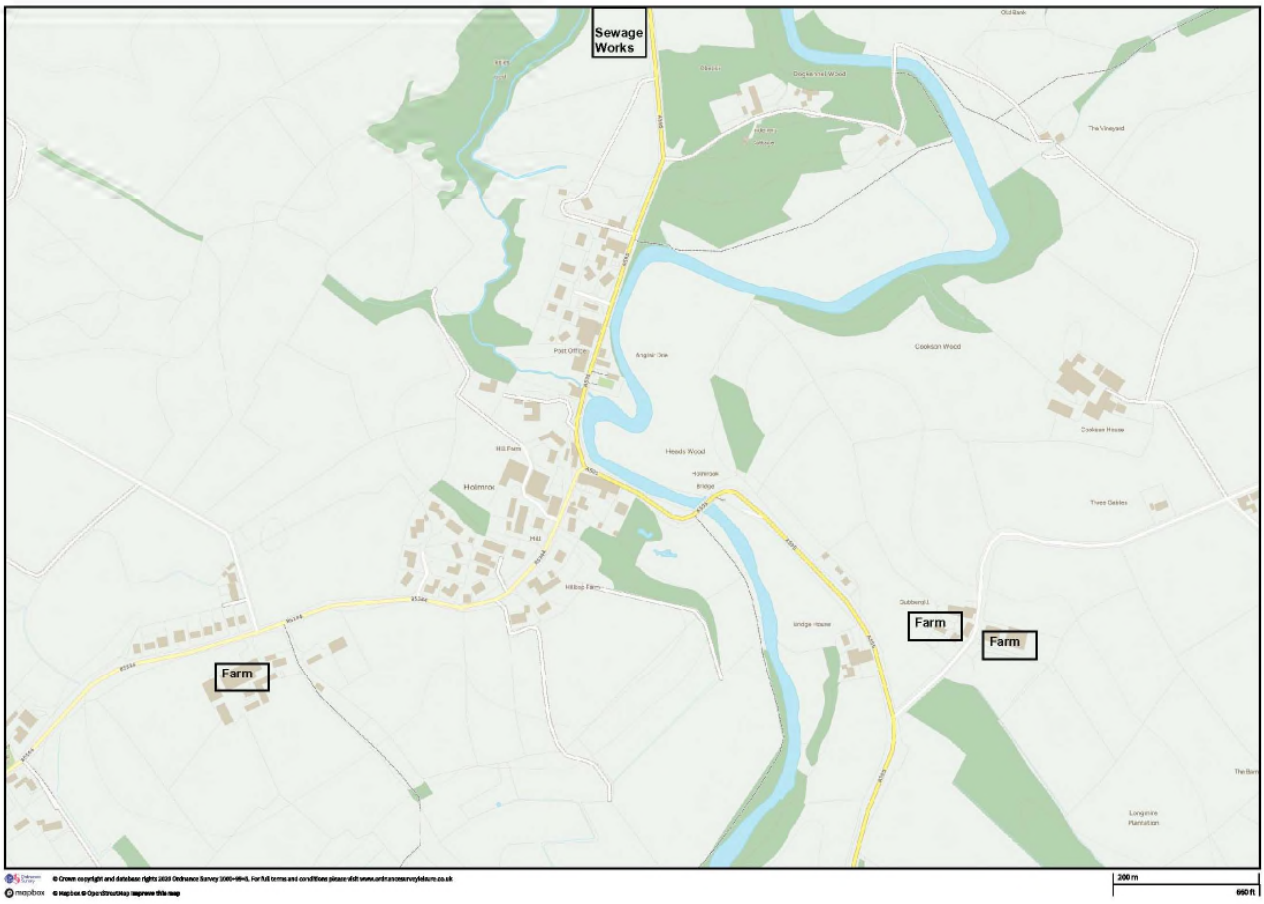
4.2 Local Context

The guidance recognises that the local context and the nature of the environment can have a bearing on the receptor sensitivity designation. This section sets out the local environment and how it might impact on receptors and their sensitivity.

4.2.1 Third party Odour Sources

The farm is surrounded on all side by agricultural land, much of it arable or grass/hay. This land will need to be fertilised on a regular basis. Given the current high cost, low sustainability and vulnerability to world events of chemical fertilisers these farms will increasingly seek to use alternatives such as manure, slurry, sewage treatment sludge and food waste. All of these fertiliser alternatives have their own odour generation potential.

The map below shows the locations of nearby farms and a sewage treatment works, all of which would be potential sources of odour.



4.2.2 Area Walkover

An area walkover was conducted on the afternoon of 18th July 2024. This walkover noted the following:

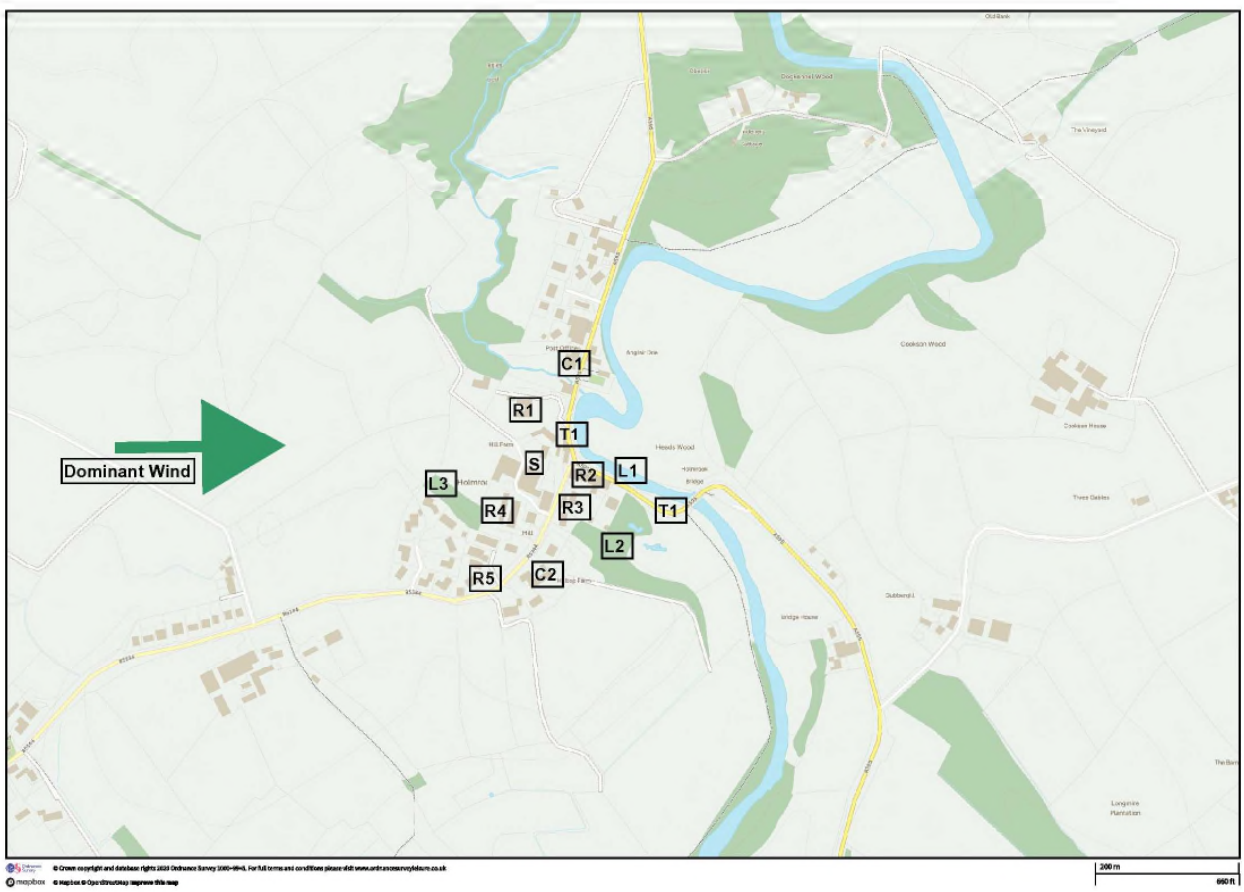
> *Upwind and uphill from Hill Farm is Hilltop. Agricultural silage or slurry odour present there at low and intermittent levels*
>
> *Regular tractor and slurry tanker movements on road*
>
> *Arla farm has distinct slurry odour. Low level and short lived*
>
> *Occasional manure odour all along road.*

All of these observations are consistent with expectations for a farming area.

4.3 Potential Receptors

Local receptors that are potentially sensitive to odour have been identified from OS Maps. The receptors are listed below and shown on the map beneath.. The odour sensitivity listed for each receptor is taken from the IAQM guidance allowing for the observations set out above.

Nature of Receptor	Direction	Approximate Distance from the Farm Centre	Reference	Sensitivity to odour
Residential	N	95m	**R1**	Highly Sensitive
Residential	E	50m	**R2**	Highly Sensitive
Residential	SE	85m	**R3**	Highly Sensitive
Residential	SW	70m	**R4**	Highly Sensitive
Residential	SW	130m	**R5**	Highly Sensitive
Transport - Road	NE	90m	**T1**	Insensitive
Transport - Road	SE	180m	**T2**	Insensitive
Leisure - River	E	160m	**L1**	Moderately Sensitive
Leisure - Woodland	SE	160m	**L2**	Moderately Sensitive
Leisure - Woodland	W	105m	**L3**	Moderately Sensitive
Commercial – Post Office	N	210	**C1**	Moderately Sensitive
Commercial - Farm	S	150	**C2**	Moderately Sensitive



5 Overall Odour Impact

5.1 Tabulation

For each receptor identified the IAQM guidance on odour impact has been tabulated below.

Receptor	Odour Risk	Sensitivity	Overall Impact
R1	Low	Highly Sensitive	Slight Adverse
R2	E	Highly Sensitive	Slight Adverse
R3	SE	Highly Sensitive	Slight Adverse
R4	SW	Highly Sensitive	Slight Adverse
R5	SW	Highly Sensitive	Slight Adverse
T1	NE	Insensitive	Negligible
T2	SE	Insensitive	Negligible
L1	E	Moderately Sensitive	Negligible
L2	SE	Moderately Sensitive	Negligible
L3	W	Moderately Sensitive	Negligible
C1	N	Moderately Sensitive	Negligible
C2	S	Moderately Sensitive	Negligible

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5.2 Conclusion

Odour impacts are shown to be negligible for all receptors except for local residential receptors. For the residential receptors the effect is predicted as slight adverse which is in line with expectations and observations for a farming area.