

Questions Regarding Impact of Odour on Amenity and Tranquillity

“Odour and dust can also be a planning concern, for example, because of the effect on local amenity.”

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Executive Statement

This document sets out key questions regarding the potential impacts of odour on amenity, and tranquillity. It identifies that the Planning application (20240544) omits an assessment of an impact of odour. It further identifies that, through the common mechanism of wind transmission, additional noise impacts on tranquillity arise, with unquantified noise, odour, and disturbance impacting the amenity and tranquillity of adjoining residents, users of the Public Right of Way and to the detriment of members of the public and residents from the viewpoint of the window to the National Landscape on the Sole Street main highway.

What are the Major Sources of Impact of Amenity and Tranquillity Arising from Viticulture?

Wine does not come out of the ground in bottles. It is produced by an industrial process with which many countries around the world, namely France, Australia, New Zealand and others, have greater experience than the UK.

Therefore, much can be learned from the experience of countries that have an extensive experience of wine production, the issues facing their regulatory regimes and recommendations they have responded with to address them.

Odour and noise are the most common sources of complaints, and wastewater effluent (a major source of odour) is reported as the greatest environmental challenges¹. This is unsurprising in the manufacture of a product for which aroma and odour are intrinsic aspects.

Since at least 2006 the main environmental impacts have been recognised by regulators as being:

1. ‘Pollution of water, degradation of soil and damage to vegetation arising from liquid and solid waste disposal practices’
2. **odours** and air emissions resulting from the management of raw materials, and wastewater, solid and semi-solid by products from the wine making process, and
3. **Noise from pumps, chillers, crushers, and other wine making equipment**, as well as **vehicle noise**, particularly during vintage¹

What Evidence Exists That Wine Making Associated with Odour?

Winemaking is a year round, water intensive exercise generating significant effluent high in 'organic load'.

A national survey commissioned by the Australian Grape and Wine Research Development Corporation identified that the quantity of organically loaded wastewater effluent varies with process, technique and operator experience, and scale (see table), the mean level being 2L / 750ml bottle, ranging from 0.4 -8L bottle, with bottling increasing the wastewater effluent by 0.9kL / per tonne of crush². Figures cited by other countries vary, for example, in one US region, a ratio of 6:1 is quoted³ and in another, up to 10:1⁴.

Table 3.6 Volume of water used in wineries by winery size class

Equivalent Crush (tonne / annum)	Water use (kL/annum)		Water use (kL/tonne crush)	
	Average	Range	Average	Range
< 1,000 ¹	1000	300 – 2,500	2.4	0.4 – 8.0
1,000 – 2,500	5,600	850 – 19,000	3.7	0.6 – 11.6
2,500 – 5,000	10,000	5,000 – 20,000	2.4	1.1 – 5.1
5,000 – 10,000	14,000	4,400 – 30,000	2.3	0.5 – 4.9
10,000 – 50,000	41,000	17,000 – 60,000	2.0	0.9 – 3.6
> 50,000	160,000	45,000 – 290,000	1.5	0.6 – 1.8
OVERALL	-	-	1.94 ± 0.21	0.4 – 11.6

¹One winery provided no estimate of water usage or wastewater volume

Wine wastewater effluent is high in *organic load* and olfactory nuisance generated by effluents is a major environmental problem facing the wine industry. '**Olfactory nuisance**' is experienced across the major wine growing regions of the world^{5,6,7} such that this issue is addressed by numerous guidelines and regulations in recognised wine growing regions around the world.

The CSIRO, Australia's national science agency described the impact on peoples lives and wellbeing as follows:

*"Odour is an intrinsic aspect of all aspects associated with winery waste management. The treatment and storage of wastewater and solid waste by products from the winemaking process must be undertaken in a way that minimises nuisance. Objectionable and offensive odours can cause significant and adverse effects on people's lives and well-being. In fact, complaints about odours are arguably one of the most frequent environmental pollution incidents reported to authorities."*⁸

Wastewater effluent production occurs throughout the various stages of wine production (harvest reception, vinification, racking, filtration, tartaric stabilization, packaging), and washing and cleaning of equipment. Washing and cleaning of equipment, tanks, and spillages is considerable and importantly, **wastewater is generated continuously, throughout the year, with peaks at certain points**⁹.

Table 3 Description of winery wastewater production periods at wineries¹

Period ²	Typical months of the year	Description
Pre-vintage	January–February	Bottling, caustic washing of tanks, non-caustic washing of equipment in readiness for vintage
Early vintage	February–March	Wastewater production is rapidly rising to peak vintage flows and has reached 40% of the maximum weekly flow; vintage operations dominated by white wine production.
Peak vintage	March–May	Wastewater generation is at its peak; vintage-only operations are at a maximum.
Late vintage	April–June	Wastewater production has decreased to 40% of the maximum weekly flow; vintage operations dominated by production of red wines; distillation of ethanol spirit may coincide with this period.
Post-vintage	May–September	Pre-fermentation operations have ceased; effect of caustic cleaning, ion exchange etc. is at its greatest, and wastewater quality may be poor.
Non-vintage	June–December	Wastewater generation is at its lowest—generally less than 30% of maximum weekly flows during vintage; wastewater quality is highly dependent on day-by-day activities.

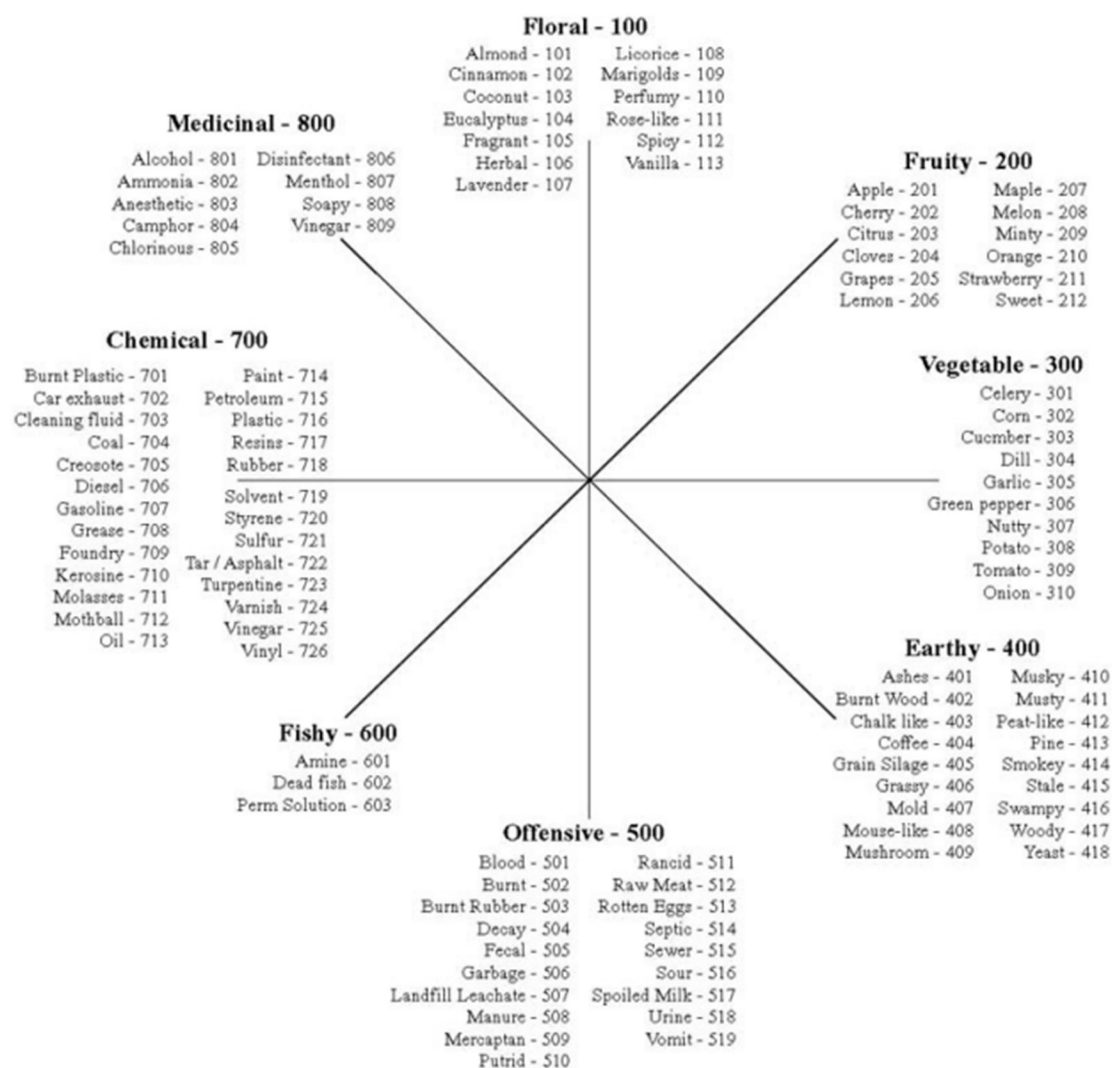
¹ Chapman et. al., *Winery Wastewater Handbook* 2001

² The demarcation between one period and another, and the timing or existence of each period, will vary between wineries and regions.

Wine, as a product of fermentation, is inherently odorous – in ways both desired and undesired. There are typically over 800 compounds in a particular wine, with many created through synthesis in the long process of fermentation. Recognised by products of wine fermentation include ‘off odours’, resulting from *malodorous volatile phenols, volatile fatty acids, amines, ammonia, sulphur compounds, nitrogen compounds and other non-methane volatile organic compounds*^{10,11,12,13, 14}

These compounds have low olfactory thresholds (i.e. they are easily detected by humans at very low concentrations) and are characterised in the scientific literature as having an odour akin to rotten eggs, burnt matches, horse sweat, urine, onion and garlic ^{15,16}

The issue of odour is sufficiently prevalent that there are numerous descriptions of its hedonic aspects, both in relation to the product and its production. The following charts, taking from the *UK Environment Agency, itself drawing upon data from other countries*¹⁷.



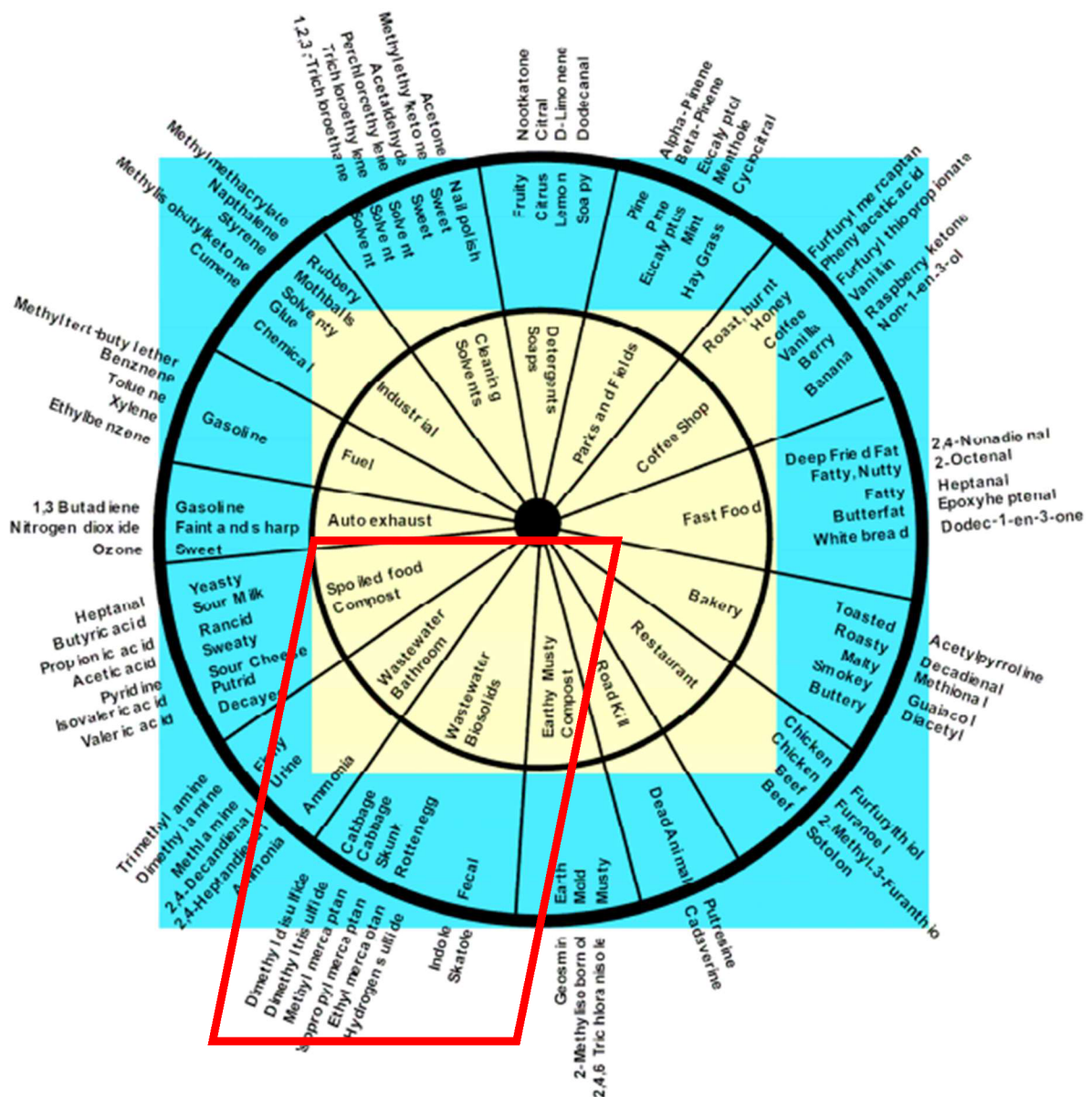


Figure 3.2 UCLA School of Public Health urban odour descriptor wheel (McGinley and McGinley 2004)

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What is the Applicants Wastewater Effluent Management Strategy?

Despite organic wastewater being a recognised major determinant of odour and having a negative impact on amenity, the submission by the Applicant makes no mention of wine wastewater effluent. In an email to Cobham Parish Council, dated 27.2.2024, Mr Sengupta informed them he would be using a mobile bottling company, though his application specified a dedicated floor area for bottling, and that outside the bottling period, *“the rest of the time the wine just sits in a vat or bottle fermenting”*. He further asserted he would be employing 10-15 people, in contrast to his contemporaneous application that stated [2-3] people would be employed and the scale of traffic would be low.

The Applicants report provides only an indication of an estimated wine production of 60,000 bottles / year, based on a fruit harvest of 61 tonnes / year. Therefore, any odour impacts on amenity from the proposed winery on adjoining residents, residents in Sole Street and those using the Public Right of Way, cannot be assessed in order for the requisite ‘greatest weight’ be given to considering any development in a sensitive area.

A crude estimate of high organic load wastewater effluent can be attempted by applying a parameter for the variation in yield tonnage (stated as 50% by the Applicants report, but alternatively estimated as up to 300% by Savills¹⁸) and the wastewater effluent : wine ratio of 2.6 (Australia) – 6 (US) to arrive at a range of wastewater effluent outputs. This crude calculation generates a very wide range within which the operator might be expected to perform within, with an a priori plausible expectation that the true estimate would be influenced by the winery operating near the beginning of the learning curve.

Bottle (vol)	Bottles (no)	Yield Multiple	Total Wine Volume	Wastewater Effluent Multiples		
				2.6	6	10
0.75	60,000	1	45000	117000	270000	450000
		1.5	67500	175500	405000	675000
		3	135000	351000	810000	1350000

As expected, the range of waste effluent generated is between 175,000 litres and 1.35 million litres of effluent depending on yield, operator efficiency and commercial decisions that can be taken to increase planting density etc. The contribution *from bottling alone* could be 54,900 litres, in the absence of any evidence of the management of wastewater effluent.

It remains unknown what potential impacts arise on sustainability, biodiversity, amenity and tranquillity arising from the management of wastewater with a high organic load.

Is the Impact of Odour on Amenity and Tranquillity Estimable Based on the Applicants Submission?

Defra guidance¹⁹ defines odour as:

"An odour is the organoleptic attribute perceptible by the olfactory organ on sniffing certain volatile substances. It is a property of odorous substances that make them perceptible to our sense of smell. The term odour refers to the stimuli from a chemical compound that is volatilised in air. Odour is our perception of that sensation and we interpret what the odour means. Odours may be perceived as pleasant or unpleasant. The main concern with odour is its ability to cause a response in individuals that is considered to be objectionable or offensive.

Odours have the potential to trigger strong reactions for good reason. Pleasant odours can provide enjoyment and prompt responses such as those associated with appetite. Equally, unpleasant odours can be useful indicators to protect us from harm such as the ingestion of rotten food. These protective mechanisms are learnt throughout our lives. Whilst there is often agreement about what constitutes pleasant and unpleasant odours, there is a wide variation between individuals as to what is deemed unacceptable and what affects our quality of life."

The magnitude of odour impact depends on several factors and the potential for adverse impacts also varies due to the subjective nature of odour perception. The FIDOR acronym is a useful reminder of the factors that can be used to help determine the degree of odour pollution:

- Frequency of detection - frequent odour incidents are more likely to result in adverse impacts;
- Intensity as perceived - intense odour incidents are more likely to result in adverse impacts;
- Duration of exposure - prolonged exposure is more likely to result in adverse impacts;
- Offensiveness - more offensive odours have a higher risk of resulting in adverse impacts; and,
- Receptor sensitivity - sensitive areas are more likely to have a lower odour tolerance.

It is important to note that according to the Environment Agency and National Planning Policy Framework, even infrequent emissions of odours may cause loss of amenity if odours are perceived to be particularly intense or offensive.

The FIDOR factors can be further considered to provide the following issues with respect to the potential for an odour emission to cause adverse impacts:

- The rate of emission of the compound(s).
- The duration and frequency of emissions.
- The time of the day that this emission occurs.
- The prevailing meteorology (wind direction, wind speeds etc.).
- The sensitivity of receptors to the emission i.e. whether the odorous compound is more likely to cause annoyance, *such as the sick or elderly*, who may be more sensitive.

- The odour detection capacity of individuals to the various compound(s) in odours.
- *The individual perception of the odour (i.e. whether the odour is regarded as unpleasant).* This is quite subjective, and may vary significantly from individual to individual. For example, some individuals may consider some odours as pleasant, such as petrol, paint and creosote, whilst others find them less tolerable.

With respect to the above, demographic data indicate that *the population of Sole Street is older than average (29% vs 19%), that ramblers are more likely to be older (mean age 67), as are the owners of the properties on Gold Street, and that the residents the property closest to the site are in their late 70's and early 80's,*

Furthermore, there are few individuals who would consider the odour of rotten eggs, burnt matches, horse sweat, urine, etc as conducive to furthering and enhancing the amenity and tranquillity of an area.

Can the Sensitive Siting of the Applicants Development be Assessed Against Odour Benchmarks?

There are no statutory odour annoyance criteria in the UK although the Environment Agency (the Agency) has published recommendations for updated guidance in respect of its role as the pollutions regulator ¹⁹.

The guidance (H4) provides a range of benchmark levels for assessing odour annoyance depending on the perceived offensiveness of the process undertaken. These are based on the 98th percentile of hourly mean concentrations modelled over a year – this is a very demanding threshold, even where the context of a sensitive National Landscape site does not arise. Expressing air quality standards as percentiles is common in the UK and has been applied to the odour offensiveness criteria as the Agency recognises that there are circumstances when it is difficult to avoid off-site odour (e.g. extreme meteorological conditions).

The Environment Agency benchmarks are as follows:

- 1.5 ouE/m³ for most offensive odours;
- 3.0 ouE/m³ for moderately offensive odours; and
- 6 ouE/m³ for less offensive odours.

Offensiveness of the odour takes into account the sensitivity of the receptor (e.g. residential receptors are categorized as more sensitive). The Environment Agency provides examples of processes that fall within each of the offensiveness categories. For most offensive odours, these include: decaying animal or fish remains; processes involving *septic effluent or sludge; and biological landfill odours*. Less offensive odours include bakeries, coffee roasting, breweries etc. These criteria are not compliance limits as it would not be possible to monitor compliance with the criteria. Therefore, they may be used for assessing the acceptability of a process (where it is possible to model emissions) or for developing stack emission limits such that compliance with a criterion can be demonstrated.

What is Known About Proximity to Dwellings, the Public Rights of Way, Odour Pathway and Impact on Amenity and Tranquillity?

The Institute of Air Quality Management issues guidance in relation to the conduct of expert assessments of odour, **specifically in relation to planning and amenity**²⁰. Dispersion modelling is a recognised technique used to model odour effects and impacts and there are numerous parameters in its calculation, several of which are pertinent to the current application. The approach is highly quantitative and requires numerous input parameters, many of which may not be available. The general approach is decomposed into the elements or source, pathway and receptor sensitivity.

As no information regarding the odour source is submitted by the applicant and, in any event, it would not be possible to validate it or control the applicants future activities, then best estimates based on a semi-qualitative or qualitative approach must suffice, taken together with the precautionary principle and ensuring the statutory ‘greatest weight’ is applied to considering the impact of the development.

It is important to note that, as The Institute of Air Quality Management states in it’s, **‘Guidance on the assessment of odour for planning’, that, “loss of amenity or disamenity does not equate directly to nuisance and significant loss of amenity will often occur at directly lower levels of odour exposure than would constitute a statutory nuisance.”**²⁰

The characterisation of receptor sensitivity is subdivided into high, medium and low.

Table 2: Receptor sensitivity to odours

For the sensitivity of people to odour, the IAQM recommends that the Air Quality Practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:

High sensitivity receptor	Surrounding land where: • users can reasonably expect enjoyment of a high level of amenity; and • 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. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium sensitivity receptor	Surrounding land where: • 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; or • 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. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Low sensitivity receptor	Surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • 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 may include industrial use, farms, footpaths and roads.

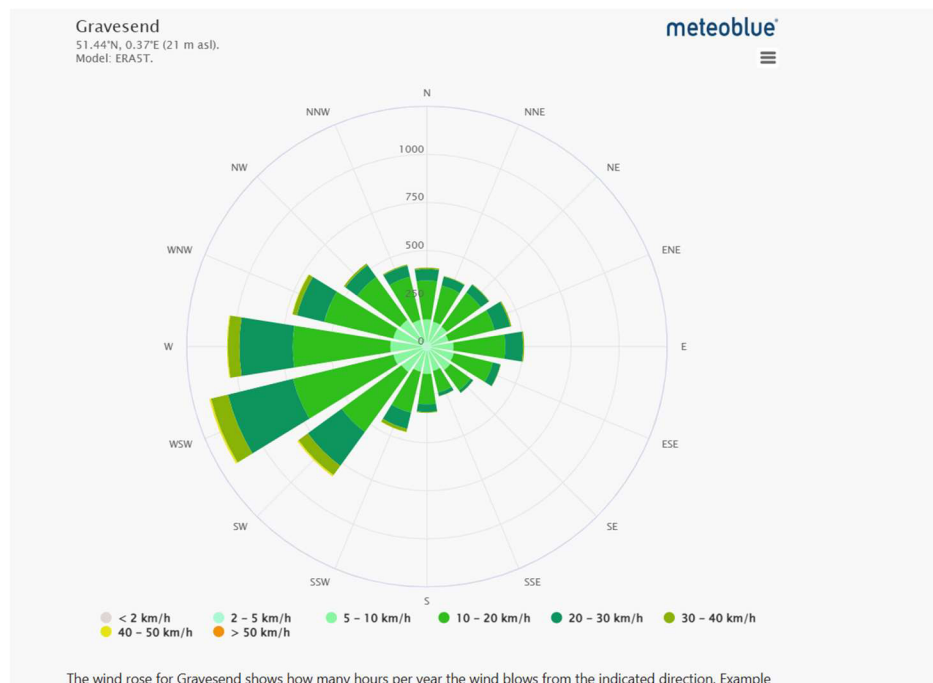
It can clearly be seen that adjoining dwelling to a source, especially those living within or adjacent to an AONB or National Landscape, would fall into the category of High Sensitivity Receptors. Similarly, those using a Public Right of Way in such an area would fall into the same group. Therefore the Council can at least be informed regarding the status of receptor sensitivity in respect of the current planning application.

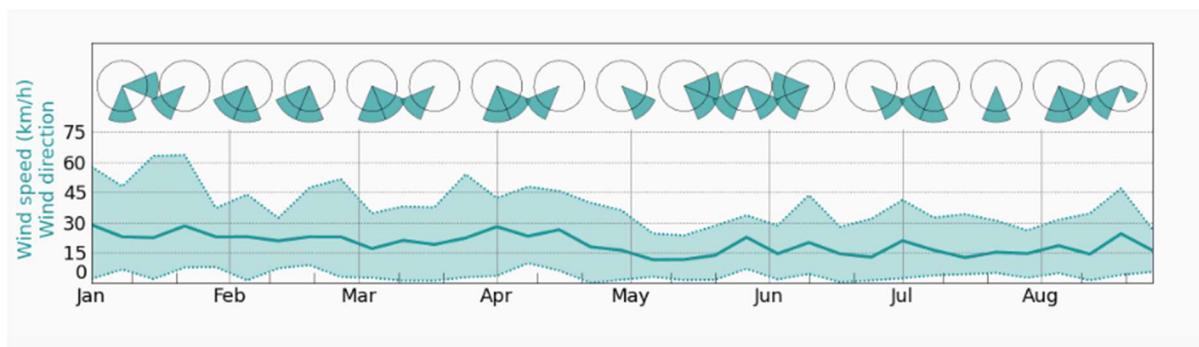
In relation to conducting an odour assessment the IAQM outline 9 criteria that include likely magnitude of emissions, meteorological conditions, dispersion and dilution afforded by the pathway and other factors. In the current case, there is no data submitted by the Applicant and considerable uncertainty in the crude estimates of the odour source and the range of values is very wide.

Meteorological Conditions

The meteorological conditions are typically assessed using a 'wind rose'. This indicates the prevailing winds are south, south westerly and easterly, that are therefore directly in the line of the public right of way and the adjoining residences, with contributions in other directions such as the main Sole Street window to the National Landscape. The path length between source and receptor is of negligible length due to the proposed siting adjoining the properties. Furthermore, the emissions emanate at ground level which is the worst possible situation as this affords minimal opportunities for dispersion not only as a result of the adjacency, but also the fact that the building has lateral openings parallel to the properties.

The 'wind rose' below shows that odour dispersion in fact occurs in all directions at the location, with a particular predilection towards the nearby properties (by virtue of wind direction, and relative proximity), towards the Public Right of Way and in an Easterly direction toward the scenic 'window to the AONB' i.e. the viewpoint from the main Sole Street Road. This situation is exacerbated by the proposed site being located, as acknowledged by the Council and reproduced and undisputed by the Applicants supplementary report, at the high point of the land. This will result in the well-recognised phenomenon of sound propagation (notably not also considered in the applicant's acoustic report) at this site, again not only to the properties but towards the window to the National Landscape on Sole Street, towards the adjoining properties and finally down to the Public Right of Way.





Does the Applicants Submission Permit a Reliable Assessment of Odour?

The following excerpts summarise key elements of an expert odour impact assessment framework, with a specific focus on amenity and planning, as recommended by the IAQM²⁰.

Box 1: Definitions of impacts and effects used in this guidance

IEMA Guidelines for Environmental Impact Assessment (2004) recommend a clear progression from the characterisation of “impact” to the assessment of the significance of the “effect” taking into account the evaluation of the sensitivity and value of the receptors. The guidelines emphasise the need to clearly define at the outset how the two terms will be used and then to apply them in a consistent fashion. In this IAQM guidance, the following definitions are used:

- **Impacts** – these are changes to the environment attributable to the development proposal.
- **Effects** – these are the results of the changes on specific receptors.
- **Receptors** – are the users of the adjacent land, which may vary in their sensitivity to odour.

An increase in odour levels (the impact) would therefore cause a particular effect (e.g. loss of amenity) if the adjacent land use was residential, and perhaps a lesser effect if the adjacent land use was an industrial facility.

Table 3: IAQM suggested descriptors for magnitudes of odour effects

		Receptor Sensitivity		
Relative Odour Exposure (Impact)		Low	Medium	High
	Very Large	Moderate adverse	Substantial adverse	Substantial adverse
	Large	Slight adverse	Moderate adverse	Substantial adverse
	Medium	Negligible	Slight adverse	Moderate adverse
	Small	Negligible	Negligible	Slight adverse
	Negligible	Negligible	Negligible	Negligible

Applicable to odours at the “most offensive” end of the relative-unpleasantness spectrum

Table 5: H4 Benchmark odour criteria

Criterion, $C_{98\text{ odour}}/\text{m}^3$	Offensiveness	Odour Emission Sources
1.5	Most Offensive	Processes involving decaying animal or fish remains Processes involving septic effluent or sludge Biological landfill odours
3.0	Moderately Offensive	Intensive livestock rearing Fat frying (food processing) Sugar beet processing Well aerated green waste composting
6.0	Less Offensive	Brewery Confectionery Coffee

The Applicants submission is deficient in respect of addressing all considerations that permit an assessment of the impact of odour. Known variables are:

- the high sensitivity of receptors using the recognised categories (negative factor)
- the proposed siting of the source at the highest point of land (negative factor)
- the proximity of odour source to the receptors (negative factor)
- the meteorological conditions being ideal for transmission along an odour pathway to the receptors, including also the PROW to the south west AND across the window to the AONB to Sole Street Road (negative factors)
- the categorisation of reported odours within the most offensive hedonic groups (negative factors)

Therefore, taken together with the prior probability of likely odour impacts identified in international sources, is the Council able to determine whether, after the application of the 'greatest weight', the applicant's proposal would not affect the amenity and tranquillity of stakeholders hitherto mentioned? It can be seen that for reasons of topography, adjacency, meteorological considerations, the availability of multiple parcels of land held by the applicant, the proposed siting is highly detrimental, in respect of odour, noise, visual impact and disturbance, on amenity and tranquillity.

Therefore the application should be refused and alternative locations submitted that do not have the potential to impinge on residents of Sole Street from the window to the AONB, residents on Gold Street, immediate neighbours and users of the Public Right of Way. Information submitted by the Applicant provides a sufficient basis to confirm these sensitive receptors would not be affected when considering the extent of the landholding declared by the Applicant.

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