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ODOUR IMPACT ASSESSMENT REPORT

MR. PATRICK LALOR
GRENNAN,
ATTANAGH,
CO. LAOIS

2019

REPORT NUMBER:	OIA_19_9345	**PREPARED BY:**	Nial Ryan, MSc
DATE:	27th February 2019		
DATE R1:	12th March 2019	**CHECKED BY:**	Martin O'Looney, BSc Michael Fraher, BSc
DATE R2:	21st March 2019		

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1.0 INTRODUCTION & SCOPE OF WORK

Panther Environmental Solutions Ltd (PES Ltd) were commissioned by Mr Patrick Lalor to carry out an Odour Impact Assessment for the proposed retention of a slatted tank, animal housing which includes cubicle area, calving boxes, milking parlour, dairy, office, plant room, slatted feeding area, calving boxes, collecting area, steel uprights at slatted feeding area, and all ancillary works and services at Grennan, Attanagh, Co. Laois.

The site is accessed by a cul-de-sac laneway, which runs adjacent to a third-party residence, farmyard and sheds, before entering the Lalor farmstead. The new shed/animal house is approximately 113 metres from the nearest residence and approximately 300 metres from the local L5750 road.

Planning permission for retention was previously submitted for this development to Laois Co. Co. (Planning Ref: 17/218) and was accepted with conditions. The application was appealed to An Bord Pleanala (Ref: APB-300315-17), where it was refused on the grounds of potential impacts to the residential amenity of an adjoining property with regard to noise, traffic and odour, justification for the siting of the structure, and the absence of appropriate assessment screening for the development.

Panther Environmental Solutions Ltd carried out an odour assessment within the site and at odour monitoring locations around the site on Monday 11th February 2019.

On the day of the odour assessment, there were approximately 60 dry cows and 30 in-calf heifers in the new shed for which retention is being sought. It is also noted that there are two additional animal houses in the farmyard.

The EPA guidance document '*Odour Impact Assessment Guidance for EPA Licensed Sites (AG5)'* was consulted as part of the preparation of this report.

The Odour Impact Assessment included:

1. Description of odour and the odour monitoring methodology used.
2. Detailing the locations for odour monitoring stations.
3. Detailing the odour measurements obtained.
4. Discussion, Recommendations & Conclusions.

2.0 LEGISLATION PERTAINING TO ODOURS IN IRELAND

The Public Health Act of 1878 introduced legislation to control nuisance in Ireland, but its execution only became viable after the implementation of the Planning and Development Act (1963) (Scannell, 1995). Any industry producing a nuisance was controlled under these regulations and subsequent pressure from environmental lobby groups together with the development of scientific measurement techniques made it practical to quantify and control the release of gaseous environmental pollutants from these enterprises.

Odour impact from any facility on the surrounding vicinity may be considered a nuisance. Section 107 of the Public Health Act 1878 states that "Sanitary authorities are bound to inspect their district for nuisances." Upon the receipt of any information respecting the existence of a statutory nuisance, the sanitary authority is obliged, if satisfied of the existence of the nuisance, to serve an abatement notice on the person by whose act or default the nuisance arises or continues or, if such a person cannot be found, on the owner or occupier of the premises on which the nuisance arises" (Scannell, 1995).

In order to control the possible pollution effects of large developments, relevant legislation was enacted under the Environmental Protection Agency (EPA) Act of 1992. Waste licensing and Integrated Pollution Control Licensing (IPC) (now IED and IPPC) for specified facility types was implemented in 1996 by the EPA and the related guidance note was termed BATNEEC (Best Available Technology Not Entailing Excessive Cost) (i.e. now BAT which complement the BATNEEC Notes) (EPA, 1996). It set out specific conditions for these industries (i.e. Intensive Agricultural Production, Landfills, Waste transfer stations, etc.) to be implemented in order to comply with the environmental requirements of the EPA.

Local authorities and the EPA have responsibility for ensuring enterprises meet their planning and environmental requirements. Where these facilities are found to be causing odour nuisance, local government enforces Section 29 of the 1987 Air Pollution Act and serves the offenders with an abatement notice. If the facility is licensed as an IPPC or Waste enterprise, the EPA can enforce the conditions of the license and either serve the facility with non-compliance for odour detected beyond the site boundary or prosecute the facility and seek a high court injunction to close the facility. Verification for the presence of odour nuisance usually encompasses the enforcement officer visiting the facility and detecting the odour beyond the boundary.

3.0 MONITORING SURVEY

3.1 METHODOLOGY

The 2010 agency guidance document '*Odour Impact Assessment Guidance for EPA Licensed Sites (AG5)'* has been used as the basis for the methodology for this assessment.

Unlike certain airborne pollutants, odour in ambient air cannot be measured by conventional chemical analyses. Odours are in most cases a complex cocktail of various substances that have intricate synergistic effects upon each other. The measurement of individual compounds in ambient air will therefore not provide useful information on the character of an odour within that air.

Such techniques involving the use of instrumentation and/or analytical methods to identify and quantify specific odorous compounds may not provide any real insight into the intensity or offensiveness of odours in human terms. The threshold concentration, for example, of many odorants is often well below their analytical detection limit and hence many odours may be deemed to be causing nuisance, although the compounds responsible for the odours are not being detected by chemical techniques.

Furthermore, interactions between mixtures of odorants may lead to synergistic or antagonistic effects, leading to difficulties in linking analytical and sensory measurements for impact assessment purposes.

Olfactometry using the human sense of odour is the most valid means of measuring odour (Dravniek et al, 1986) and at present is the most commonly used method to measure the concentration of odour.

Representative sampling for olfactometry analysis of air may be suitable for point source emissions or at times ambient assessments on a site (i.e. within a site's boundary), however sampling air beyond a site boundary for olfactometry purposes is highly unlikely to be representative of odour impact.

Due to the unsuitability of the above measurement approaches, the EPA guidance AG5 procedure describes a "sniff testing" approach to odour assessment. This requires a human assessor to use their own sense of odour to assess odours by means of a sensory technique referred to as '*sniff testing*'.

3.2 MEASUREMENT PARAMETERS

The following key describes the numerical values used to describe observation point sensitivity, wind strength, odour persistence, and odour intensity as per the Agency Guidance Document 2010 (AG5).

Note 1: Observation point Sensitivity (assuming detectable, if not then 0)		
0	Remote (no housing, commercial/industrial premises or public area within 500m of observation point)	
1	Low sensitivity (no housing, commercial/industrial premises or public area within 100m of observation point)	
2	Moderate sensitivity (housing, commercial/industrial premises or public area within 100m of observation point)	
3	High sensitivity (housing, commercial/industrial premises or public area within area of observation point)	
4	Extra sensitive (complaints arising from residents, businesses and users of public areas within area of observation point)	
Note 2: Wind Strength		
0	Calm	Smoke rises vertically
1	Light air	Direction of wind is shown by smoke drift, but not wind-vanes.
2	Light Breeze	Wind felt on face; leaves rustle, ordinary vane moved by wind.
3	Gentle Breeze	Leaves and small twigs in constant motion.
4	Moderate Breeze	Raises dust and loose paper; small branches are moved.
5	Fresh Breeze	Small trees in leaf begin to sway.
6	Strong Breeze	Large branches in motion; umbrellas used with difficulty against the wind.
7	Near Gale	Whole trees in motion; inconvenience felt when walking against wind.
8	Gale	Twigs break off trees; progress generally impeded.
9	Strong Gale	Slight structural damage occurs (chimney pots and slates removed).
Note 4: Odour Persistence		
0	No Odour	
1	Intermittent (detected intermittently during the period of assessment)	
2	Persistent (detected throughout the period of assessment)	
Note 5: Odour Intensity		
0	No detectable odour	
1	Faint Odour (barely detectable, need to stand still and inhale facing the wind)	
2	Moderate Odour (easily detectable while walking and breathing normally, possibly offensive)	
3	Strong Odour (bearable but offensive – might make clothes / hair smell?)	
4	Very Strong Odour (unbearable, difficult to remain in area affected by odour)	

Wind direction is given as '*the direction from which wind blows*' as per Agency Odour Investigation Field Record Sheets.

3.3 MONITORING LOCATIONS

The three odour sensitive locations (OSL's) are mapped in Appendix A and described below. Distances referenced are from the boundary of the facility.

- **OSL1 –** Residence 400m North-East
- **OSL2 –** Residence 240m South-East
- **OSL3 –** Farmyard and associated residence located at the eastern site boundary.

Additional odour monitoring (OM) locations were selected during the survey period in order to provide for the drawing of an indicative odour plume for each survey, as per EPA (AG5) guidance.

Distances listed below are between the monitoring locations (OM) and odour sources (OS) detectable at that monitoring location. These distances were progressively decreased and any change in odour intensity or odour persistence was noted.

- **OM1 –** No odour source detected
- **OM2 –** No odour source detected
- **OM3 –** No odour source detected
- **OM4 –** 1m South-East of OS6
- **OM5 –** 4m South of OS5
- **OM6 –** No odour source detected
- **OM7 –** No odour source detected
- **OM8 –** No odour source detected
- **OM9 –** 2.5m West of OS1
- **OM10 –** 1.5m West of OS2
- **OM11 –** 8m North-West of OS3
- **OM12 –** 8.5m North of OS3
- **OM13 –** 15m North-East of OS3
- **OM14 –** 17m North-East of OS7/8
- **OM15 –** 14.5m North-East of OS4/5
- **OM16** – 14.5m North-East of OS6

The off-site odour monitoring locations were based on recognised measurement criteria to give an accurate view and indication of the level of odour to which odour sensitive areas are exposed, such as dwelling houses and public areas.

The on-site monitoring locations give an accurate view and indication of the level of odour to which the environment surrounding the facility and within the site boundary are exposed.

3.4 MONITORING RESULTS

The detailed results of monitoring are provided within the Odour Investigation Field Record Sheet in Table 3.1 and Table 3.2 below, which are based upon the 2010 EPA guidance document "*Odour Impact Assessment Guidance for EPA Licenced Facilities (AG5)*".

An odour assessment was carried out at odour source locations and monitoring locations within the site boundary on Monday 11th February 2019.

Mr. Nial Ryan of Panther Environmental Solutions Ltd conducted the monitoring.

Table 3.1: Odour Monitoring Results

General	**Reference**	**Site Location**	**Assessment by**			**Date of Assessment**
	OIA_19_9345	**Mr. Patrick Lalor, Grennan, Attanagh, Co. Laois**	Your Name: Other Investigators present:	**Nial Ryan**		**11-02-2019**
Pre–Assessment Preparation	Observer is free from medical conditions (cold, sore throat, sinus trouble)?	Observer abstinence (30 min) from smoking, flavoured drinks, scented toiletries and deodorisers?	Reason for odour assessment – Complaint verification; routine; other (specify).	Map – Has a map showing assessment locations been attached?	Weather Conditions Note 3 (record wind info on page 2)	
	YES	**YES**	**Odour Impact Assessment**	**YES**	**Dry, overcast, mild with very slight breeze.**	

Notes (the ranking systems in these notes must be used when completing the field observations table overleaf)

Note 1: Observation point Sensitivity (assuming detectable, if not then 0)

0 Remote (no housing, commercial/industrial premises or public area within 500m of observation point)
1 Low sensitivity (no housing, commercial/industrial premises or public area within 100m of observation point)
2 Moderate sensitivity (housing, commercial/industrial premises or public area within 100m of observation point)
3 High sensitivity (housing, commercial/industrial premises or public area within area of observation point)
4 Extra sensitive (complaints arising from residents, businesses and users of public areas within area of observation point)

Note 2: Wind Strength

0	Calm	Smoke rises vertically
1	Light air	Direction of wind shown by smoke drift, but not wind vanes
2	Light Breeze	Wind felt on face; leaves rustle, ordinary vane moved by wind
3	Gentle Breeze	Leaves and small twigs in constant motion
4	Moderate Breeze	Raises dust and loose paper; small branches are moved
5	Fresh Breeze	Small trees in leaf begin to sway
6	Strong Breeze	Large branches in motion; umbrellas used with difficulty against the wind
7	Near Gale	Whole trees in motion; inconvenience felt when walking against wind
8	Gale	Twigs break off trees; progress generally impeded
9	Strong Gale	Slight structural damage occurs (chimney pots and slates removed)

Note 3: Weather Conditions

Precipitation – dry, rained recently, drizzle, raining, foggy
Temperature – cold, cool, warm, hot

Note 4: Odour Persistence

0 No Odour
1 Intermittent (detected intermittently during the period of assessment)
2 Persistent (detected throughout the period of assessment)

Note 5: Odour Intensity

0 No detectable odour
1 Faint Odour (barely detectable, need to stand still and inhale facing the wind)
2 Moderate Odour (easily detectable while walking and breathing normally, possibly offensive)
3 Strong Odour (bearable but offensive – might make clothes / hair smell?)
4 Very Strong Odour (unbearable, difficult to remain in area affected by odour)

Odour Source Investigation (Post Odour Survey)	Start Time	Do any of the odours experienced on-site match in character those recorded during the off-site survey?	List areas inspected	What relevant activities were occurring on-site during the off-site odour assessment?
	13.30	**No site related odour was detected off-site.**	**Entire site within boundary & four locations outside.**	**Normal Operations: cattle feeding using mixing trailer, shed cleaning using skimmer attachment.**
	Finish Time	Potential on-site odour sources identified		
	15.16	**Collecting Yard, Feed Trough, Calving/Bedding Area, Slatted Tank, Slatted House #1, Slatted House #2, Silage Pits**		

ODOUR IMPACT ASSESSMENT

MR. PATRICK LALOR, GRENNAN, ATTANAGH, CO. LAOIS

	Observer Location		Wind (nd = if not detectable)			Time		Odour Rating		Odour Description Comments
Parameter	Name of household / commercial site (describe so that location can be easily identified again by a third party)	Sensitivity (0-4) Note 1	Direction from which wind blows	Orientation (Observer Vs. facility)	Strength Note 2	Start Time (24hr clock)	Period of observation	Odour Persistence (0-2) Note 4	Odour Intensity (0-4) Note 5	Description of any odours, other source(s) of odours etc. (Also note variable weather conditions etc.)
Thresholds that could indicate nuisance	…	≥3	…	Down-Wind Approx. DW or not detectable etc.	…	…	mins	1 or 2	≥2	**Guide-** A location where the score meets or exceeds all the threshold values may be deemed subject to nuisance/significant impairment, particularly if the observations are supported by public complaints on impact, frequency and duration of odours.
Field Observations	**OSL1**	**2**	**S.W.**	**D.W.**	**2**	**13.30**	**5**	**0**	**0**	**Odour from local vegetation. No site related odour detected.**
	OSL2	**2**	**S.W.**	**C/D.W.**	**2**	**13.38**	**5**	**0**	**0**	**Odour from local vegetation. Lingering vehicle exhaust fumes. No facility odour detected.**
	OSL3	**4**	**S.W.**	**C.W.**	**2**	**13.50**	**5**	**0**	**0**	**Faint agricultural odour, not attributable to on-site odour sources.**
Brief details of any meeting with local residents/complaints received during assessment (include names/addresses/telephone numbers etc.):										

	Observer Location		Wind (nd = if not detectable)			Time		Odour Rating		Odour Description Comments
Parameter	**Name of household / commercial site (describe so that location can be easily identified again by a third party)**	Sensitivity (1-5) Note 1	Direction from which wind blows	Orientation (Observer Vs. facility)	Strength Note 2	Start Time (24hr clock)	Period of observation	Odour Persistence (0-2) Note 4	Odour Intensity (0-4) Note 5	Description of any odours, other source(s) of odours etc. (Also note variable weather conditions etc.)
Thresholds that could indicate nuisance	**…**	≥3	…	Down-Wind Approx. DW or not detectable etc.	…	…	mins	1 or 2	≥2	**Guide-** A location where the score meets or exceeds all the threshold values may be deemed subject to nuisance/significant impairment, particularly if the observations are supported by public complaints on impact, frequency and duration of odours.
Field Observations	**OM1**	**1**	**S.W.**	**C/D.W.**	**2**	**13:45**	**2**	**0**	**0**	**No site related odour detected**
	OM2	**2**	**S.W.**	**D.W.**	**2**	**13:57**	**2**	**0**	**0**	**No site related odour detected**
	OM3	**2**	**S.W.**	**C/D.W.**	**2**	**14:00**	**2**	**0**	**0**	**No site related odour detected**
	OM4	**2**	**S.W.**	**C.W**	**2**	**14:03**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Slatted Shed #2**
	OM5	**2**	**S.W.**	**C/U.W**	**2**	**14:06**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Slatted Shed #1**
	OM6	**1**	**S.W.**	**C.W**	**2**	**14:09**	**2**	**0**	**0**	**No site related odour detected**
Brief details of any meeting with local residents/complaints received during assessment (include names/addresses/telephone numbers etc.):										

	Observer Location		Wind (nd = if not detectable)			Time		Odour Rating		Odour Description Comments
Parameter	**Name of household / commercial site (describe so that location can be easily identified again by a third party)**	Sensitivity (1-5) Note 1	Direction from which wind blows	Orientation (Observer Vs. facility)	Strength Note 2	Start Time (24hr clock)	Period of observation	Odour Persistence (0-2) Note 4	Odour Intensity (0-4) Note 5	Description of any odours, other source(s) of odours etc. (Also note variable weather conditions etc.)
Thresholds that could indicate nuisance	**…**	≥3	…	Down-Wind Approx. DW or not detectable etc.	…	…	mins	1 or 2	≥2	**Guide-** A location where the score meets or exceeds all the threshold values may be deemed subject to nuisance/significant impairment, particularly if the observations are supported by public complaints on impact, frequency and duration of odours.
Field Observations	**OM7**	**1**	**S.W.**	**C/U.W.**	**2**	**14:12**	**2**	**0**	**0**	**No site related odour detected**
	OM8	**1**	**S.W.**	**U.W.**	**2**	**14:16**	**2**	**0**	**0**	**No site related odour detected**
	OM9	**1**	**S.W.**	**U.W.**	**2**	**14:19**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Collecting Yard**
	OM10	**1**	**S.W.**	**U.W**	**2**	**14:22**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Feed Through**
	OM11	**1**	**S.W.**	**C.W**	**2**	**14:25**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Calving/Bedding Area**
	OM12	**1**	**S.W.**	**C.W**	**2**	**14:29**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Calving/Bedding Area**
Brief details of any meeting with local residents/complaints received during assessment (include names/addresses/telephone numbers etc.):										

	Observer Location		Wind (nd = if not detectable)			Time		Odour Rating		Odour Description Comments
Parameter	**Name of household / commercial site (describe so that location can be easily identified again by a third party)**	Sensitivity (1-5) Note 1	Direction from which wind blows	Orientation (Observer Vs. facility)	Strength Note 2	Start Time (24hr clock)	Period of observation	Odour Persistence (0-2) Note 4	Odour Intensity (0-4) Note 5	Description of any odours, other source(s) of odours etc. (Also note variable weather conditions etc.)
Thresholds that could indicate nuisance	**…**	≥3	…	Down-Wind Approx. DW or not detectable etc.	…	…	mins	1 or 2	≥2	**Guide-** A location where the score meets or exceeds all the threshold values may be deemed subject to nuisance/significant impairment, particularly if the observations are supported by public complaints on impact, frequency and duration of odours.
Field Observations	**OM13**	**1**	**S.W.**	**U.W.**	**2**	**14:33**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Calving/Bedding Area**
	OM14	**2**	**S.W.**	**U.W.**	**2**	**14:35**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Silage Pits & Slatted Tank**
	OM15	**2**	**S.W.**	**U.W.**	**2**	**14:39**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Slatted Tank/Slatted Shed #2**
	OM16	**2**	**S.W.**	**U.W**	**2**	**14.43**	**2**	**1**	**1**	**Very faint intermittent odour detected. Source: Slatted Shed #2**
Brief details of any meeting with local residents/complaints received during assessment (include names/addresses/telephone numbers etc.):										

Table 3.2: Odour Source Monitoring Results

	Observer Location		Time		Odour Rating		Odour Description Comments
Parameter	Name of household / commercial site (describe so that location can be easily identified again by a third party)		Start Time (24hr clock)	Period of observation	Odour Persistence (0-2) Note 4	Odour Intensity (0-4) Note 5	Description of any odours, other source(s) of odours etc. (Also note variable weather conditions etc.)
Thresholds that could indicate nuisance	…		hh:mm	mins	1 or 2	≥2	**Guide-** A location where the score meets or exceeds all the threshold values may be deemed subject to nuisance/significant impairment, particularly if the observations are supported by public complaints on impact, frequency and duration of odours.
Field Observations	**OS1**	**Collecting Yard (Retention)**	**14:47**	**1**	**1**	**2**	**Faint intermittent odour. Recently washed down manure odour.**
	OS2	**Feed Trough (Retention)**	**14:49**	**1**	**1**	**1**	**Very faint intermittent odour. Agricultural feed odour from build-up of material.**
	OS3	**Calving/Bedding Area (Retention)**	**15:02**	**1**	**2**	**2**	**Faint persistent odour. Peat/manure odour from bedding within shed.**
	OS4	**Slatted Tank**	**15:05**	**1**	**2**	**2**	**Faint persistent odour. Slurry odour from material within tank.**
	OS5	**Slatted House #1**	**15:08**	**1**	**2**	**3**	**Distinct persistent odour. Cattle/manure odour from within shed.**
	OS6	**Slatted House #2**	**15:11**	**1**	**2**	**2**	**Faint persistent odour. Cattle/manure odour from within shed.**
	OS7	**Silage Pit No.1**	**15:13**	**1**	**1**	**2**	**Faint intermittent odour. Crop/vegetation odour from Silage within pit.**
	OS8	**Silage Pit No.2**	**15:15**	**1**	**1**	**2**	**Faint intermittent odour. Crop/vegetation odour from Silage within pit.**

4.0 DISCUSSION

Air quality in this region is generally good and reflective of the rural climate in Ireland with odour sources of a minor nature.

Weather conditions during the odour survey were mild (10-15°C), dry with scattered cloud and gentle to moderate breezes (5-10 knots). Wind direction was somewhat variable during the survey periods; however, the dominant wind direction was from the south-east. Due to the mild temperatures and light winds, conditions for the transmission of odours from the site were good.

Potential sources of odours within the site were identified and included the Collecting Yard, Feed Trough, Calving/Bedding Area, Slatted Tank, Slatted House #1, Slatted House #2 and the Silage Pits.

4.1 DISCUSSION OF SOURCE ODOUR ASSESSMENT

The following table provides a summary of odours detected within the site at the source of the odour.

No signature odour sources were detected in or around the yard area or within the greenfield to the west of the site, which were primarily downwind of all primary odour sources.

Additionally, no signature odours relevant to the site were detected in or around the main gate, the hardcore access road, the store or the derelict dwelling within the site boundary, which were down/cross wind of all on-site odour sources during the assessment.

Table 4.1: Summary of Source Odour Survey

MONITORING LOCATIONS		ODOUR PERSISTENCE	ODOUR INTENSITY
SOURCE ODOUR ASSESSMENT			
OS1	Collecting Yard **(Retention)**	**1**	**2**
OS2	Feed Trough **(Retention)**	**1**	**1**
OS3	Calving/Bedding Area **(Retention)**	**2**	**2**
OS4	Slatted Tank **(Retention)**	**2**	**2**
OS5	Slatted House #1	**2**	**3**
OS6	Slatted House #2	**2**	**2**
OS7	Silage Pit No.1	**1**	**2**
OS8	Silage Pit No.2	**1**	**2**

A persistent localized distinct manure type odour was detected within the slatted house (OS5) located at the centre of the site. This would be considered a typical odour level with regards to cattle that are kept within a shed over the winter period, which is common farming practice in rural Ireland.

A persistent localized faint manure type odour was detected within the second slatted house (OS6). This structure contains a large open wall (see Appendix C - Figure OS6) which allows for good ventilation. As a result of this, the odour intensity was reduced when compared to the other slatted house, which is only open at the two gable ends (see Appendix C - Figure OS5).

An intermittent localized faint crop/sweet/grass type odour was detected within the silage pits (OS7 & OS8). This material is kept covered at all times and was uncovered during the assessment period for when the cattle feeding was occurring.

The slatted tank (OS4), which is used to store dairy washings or slurry, was found to be producing a persistent and faint manure odour.

Odour Source Locations OS1, OS2 and OS3 are located in the new structure which is subject to this planning application for retention.

The collecting yard (OS1) was found to be producing an intermittent and faint manure odour, as fresh manure on the concrete surface had been exposed with a rubber scraper used as part of the dry-cleaning process prior to the commencement of the odour assessment.

The feed trough (OS2) was found to be producing an intermittent and faint agricultural feed odour as a result of a build-up of material within.

The Calving/Bedding Area (OS3) was found to be producing a persistent and faint peat/ manure type odour as a result of a bedding material.

All on-site odour sources would be considered commonplace with a farmyard and typical of rural Ireland.

Generally, site management in relation to potential odours was found to be good and typical of farmyard management practices in Ireland. The silage pits are covered when not in use.

Manure/slurry was stored within underground tanks and is not frequently agitated and concrete surfaces are cleaned of fresh manure.

Odour sources at the new development area seeking retention were found to be of lower or similar intensity and persistence to the existing farmyard area. While the new development would increase the in-combination effect of odour generation from the farmyard, it is considered that this would only be a notable deviation from the existing conditions at the site in the event of poor housekeeping standards, or during annual removal of slurry / manure.

4.2 DISCUSSION OF ODOUR IMPACT ASSESSMENT

Odour monitoring was conducted, as per the "*sniff testing*" methodology outlined within the EPA Guidance Note (AG5), at monitoring locations outside the site boundary. A map detailing the locations of these monitoring locations may be found within Appendix A of this report.

Wind conditions during the monitoring survey were principally gentle to moderate breezes from the south-east. Temperatures were cool to mild, ranging from 10 to 15 °C.

As can be seen in the Kilkenny City Rose Diagram, as per Appendix B, the prevailing wind direction in this area range between west and south, which have a total percentage occurrence frequency of 48.5% (hourly data). Wind from the south have a total percentage occurrence frequency of 10.7%, while wind from the west have a total percentage occurrence frequency of 10.5% of yearly hours.

The table below summarises the findings of the odour assessment at monitoring locations beyond the boundary, and the extent and character of odour plumes on the day of the assessment.

The threshold at which an odour may be considered likely to cause a nuisance, as per the EPA AG5 methodology, are odours occurring at a downwind receptor of Persistence 1 or 2 (intermittent to persistent) and Intensity ≥2 (moderate or stronger).

Table 4.2: Summary of Odour Impact Survey

MONITORING LOCATIONS		ODOUR PERSISTENCE	ODOUR INTENSITY
ODOUR IMPACT ASSESSMENT			
OSL1	Residence 400m North-East	**0**	**0**
OSL2	Residence 240m South-East	**0**	**0**
OSL3	Farmyard and associated residence located at the eastern site boundary.	**0**	**0**
PLUME INVESTIGATION ASSESSMENT			
OM1	No odour source detected	**0**	**0**
OM2	No odour source detected	**0**	**0**
OM3	No odour source detected	**0**	**0**
OM4	1m South-East of OS6	**1**	**0-1**
OM5	4m South of OS5	**1**	**0-1**
OM6	No odour source detected	**0**	**0**
OM7	No odour source detected	**0**	**0**
OM8	No odour source detected	**0**	**0**
OM9	2.5m West of OS1	**1**	**0-1**
OM10	1.5m West of OS2	**1**	**0-1**
OM11	8m North-West of OS3	**1**	**0-1**
OM12	8.5m North of OS3	**1**	**0-1**
OM13	15m North-East of OS3	**1**	**0-1**
OM14	17m North-East of OS7/8	**1**	**0-1**
OM15	14.5m North-East of OS4/5	**1**	**0-1**
OM16	14.5m North-East of OS6	**1**	**0-1**

The closest residential location to the development proposed for retention is 113m east-north-east (OSL3). On the day the assessment was undertaken no odour, of persistence or intensity was detected from the development to be retained was perceived at OSL3.

No odours related to the on-site sources were detected at any of the three odour sensitive locations (OSL's), which during the monitoring periods, one was crosswind, one was down/cross wind and one was downwind of the principal odour sources.

Therefore, facility related odours detected at odour sensitive locations off-site were below the "*threshold that could indicate nuisance*" as per the EPA AG5 Guidance methodology.

Site related odours were detected at plume monitoring locations OM4–OM5 and OM9–OM16, which are all within the site boundary, with OM13–OM16 being directly downwind of the principal odour sources. These threshold locations were determined by walking from a downwind location, upwind towards the source and noting changes in odour characteristics.

A very faint intermittent manure type odour was detected at OM4 and OM5, which are located crosswind of all principal odour sources. These odours were deemed to have originated from Slatted Shed #1 and Slatted Shed #2.

A very faint intermittent manure/agricultural feed type odour was detected at OM9 – OM12, which are located up-wind and crosswind of all principal odour sources. These odours were deemed to have originated from the Collecting Yard, Feed Trough and Calving/Bedding Area. Upon decreasing the distance between OM9 and the Collecting Yard the odour intensity increased to faint at the source.

A very faint intermittent peat/manure type odour was detected at OM13, which are located downwind of all principal odour sources. These odours were deemed to have originated from the Calving/Bedding Area. Walking upwind from OM13 to the Calving/Bedding Area, the odour intensity increased to faint at the source, while the persistence increased from intermittent to persistent.

A very faint intermittent cut grass/vegetation type odour was detected at OM14, which are located downwind of all principal odour sources. These odours were deemed to have originated from the silage pits. Upon decreasing the distance between OM14 and the silage pits, the odour intensity increased to faint at the source.

A very faint intermittent manure/slurry type odour was detected at OM15, which are located downwind of all principal odour sources. These odours were deemed to have originated from the Slatted Tank and Slatted Shed #1. Walking upwind from OM15 to the Slatted Tank, the odour intensity increased to faint at the source, while the persistence increased from intermittent to persistent. Upon decreasing the distance between OM15 and Slatted Shed #1, the odour intensity increased to distinct at the source, while the persistence increased from intermittent to persistent.

A very faint intermittent manure type odour was detected at OM16, which are located downwind of all principal odour sources. These odours were deemed to have originated from the Slatted Shed #2. Upon decreasing the distance between OM16 and the Slatted Shed #2, the odour intensity increased to faint at the source, while the persistence increased from intermittent to persistent.

Using these odour monitoring points, an indicative odour plume has been drawn, as per Appendix A.2.

5.0 RECOMENDATIONS

Following on from the results of this odour assessment report, the following is recommended;

- Ensure external areas and vehicles are cleaned as required, including passageways and yards.

- Livestock area
  - Wash down fresh manure from slatted sheds and concrete pads regularly.
  - Optimise crude protein levels in feed, thus minimizing nitrogen excretion.

- Ensure silage storage pits remain covered when not in use.

- Ensure waste bins are covered and removed regularly. Ensure same for any other potentially odorous waste.

- Carry out potentially odorous activities (i.e. slurry agitation / removal of deep bedding manure) outside of optimal weather conditions for odour dispersion wherever practicable – i.e. warm weather and light breeze. Be cognisant of wind direction and sensitive receptor locations during such activities.

- Roads
  - Ensure site roads are kept clear of odorous materials.
  - Inspect surrounding public roads for manure following removal of cattle or slurry.

6.0 CONCLUSIONS

- Odour sources, at the new development area seeking retention, were found to be of lower or similar intensity and persistence to the existing farmyard area.

- The types of odours detected would be considered typical of a farmyard containing cattle and common-place within rural Ireland. It should be noted that during the Spring, Summer and Autumn months, cattle would be held in external field areas and not within the slatted sheds, thus reducing the odour within the farmyard area.

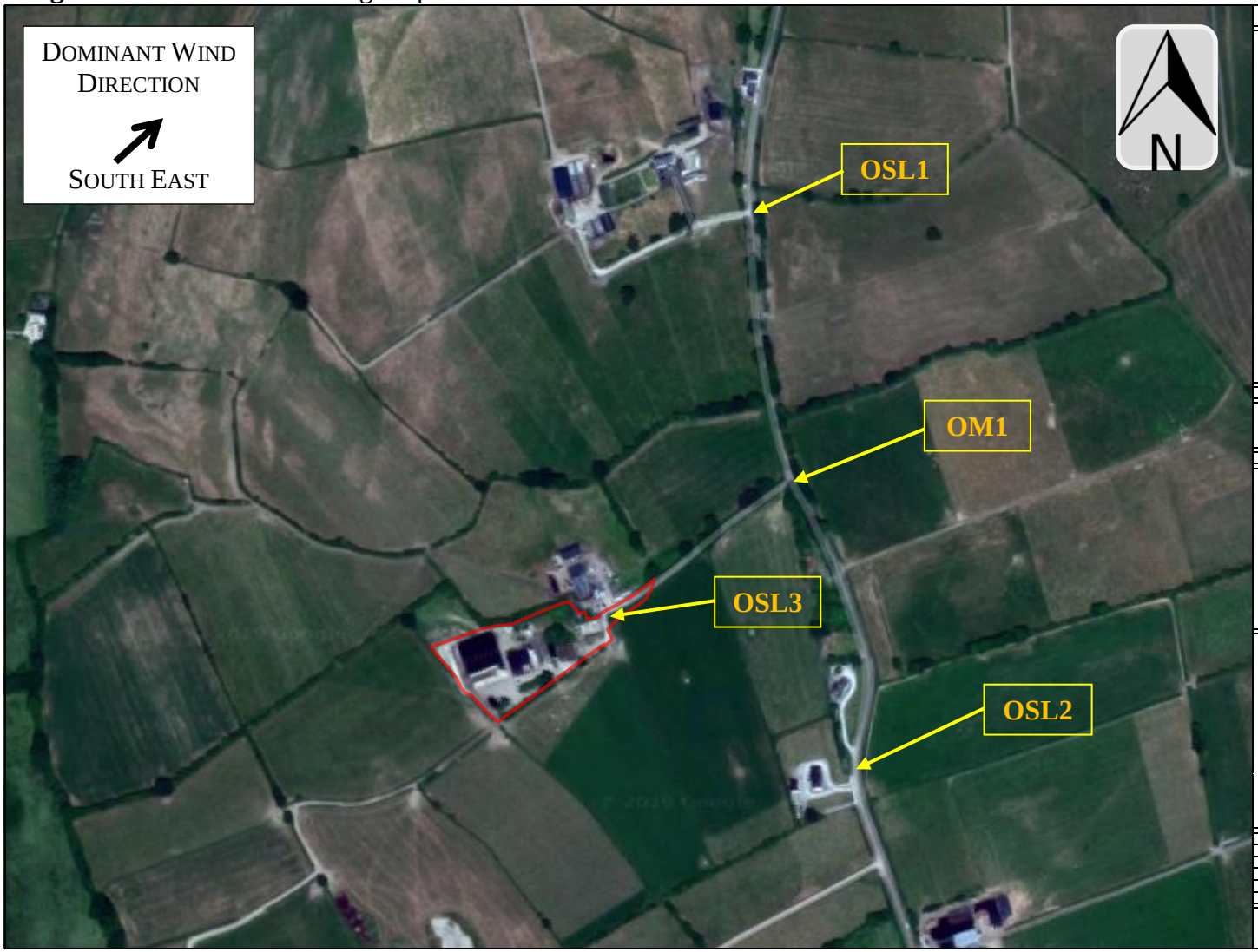
- It is concluded that there is the potential for the existing slatted sheds and slatted tank related odours to be detected outside of the site boundary in unfavourable weather condition. However, site related odours at OSL3, nearby farmyard and associated residence, are unlikely to "*cause a nuisance*" as such odours would be synergistic with the ongoing farmyard operation at that location.

- No odours related to the site were detected at any of the three odour sensitive locations (OSL's), one of which was crosswind, one downwind and one cross/downwind of the principal odour sources. Therefore, odours were below the "*threshold that could indicate nuisance*" as per the EPA AG5 Guidance methodology.

APPENDIX A

- MONITORING POINTS AND -
- ODOUR SOURCE MAP -

Figure A.1: Odour Monitoring Map



Notes

OSL - Odour Sensitive Location

OM - Odour Monitoring Location

Orientation and distance from boundary:

OSL1 – 400m North-East
OSL2 – 240m South-East
OSL3 – At boundary of Site

OM1 – Public Road 200m East-N-E

Project Title:

MONITORING MAP

Client Name:

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Drawing Status:	**Scale:**	NTS	A4
Report	**Datum:**		Google Earth Pro
Drawing Number:	**Drawn:**		NR
	Checked:		MF
Revision:	**Approved:**		-
R0	**Date:**		20/02/2019

Figure A.2: Odour Plume Map

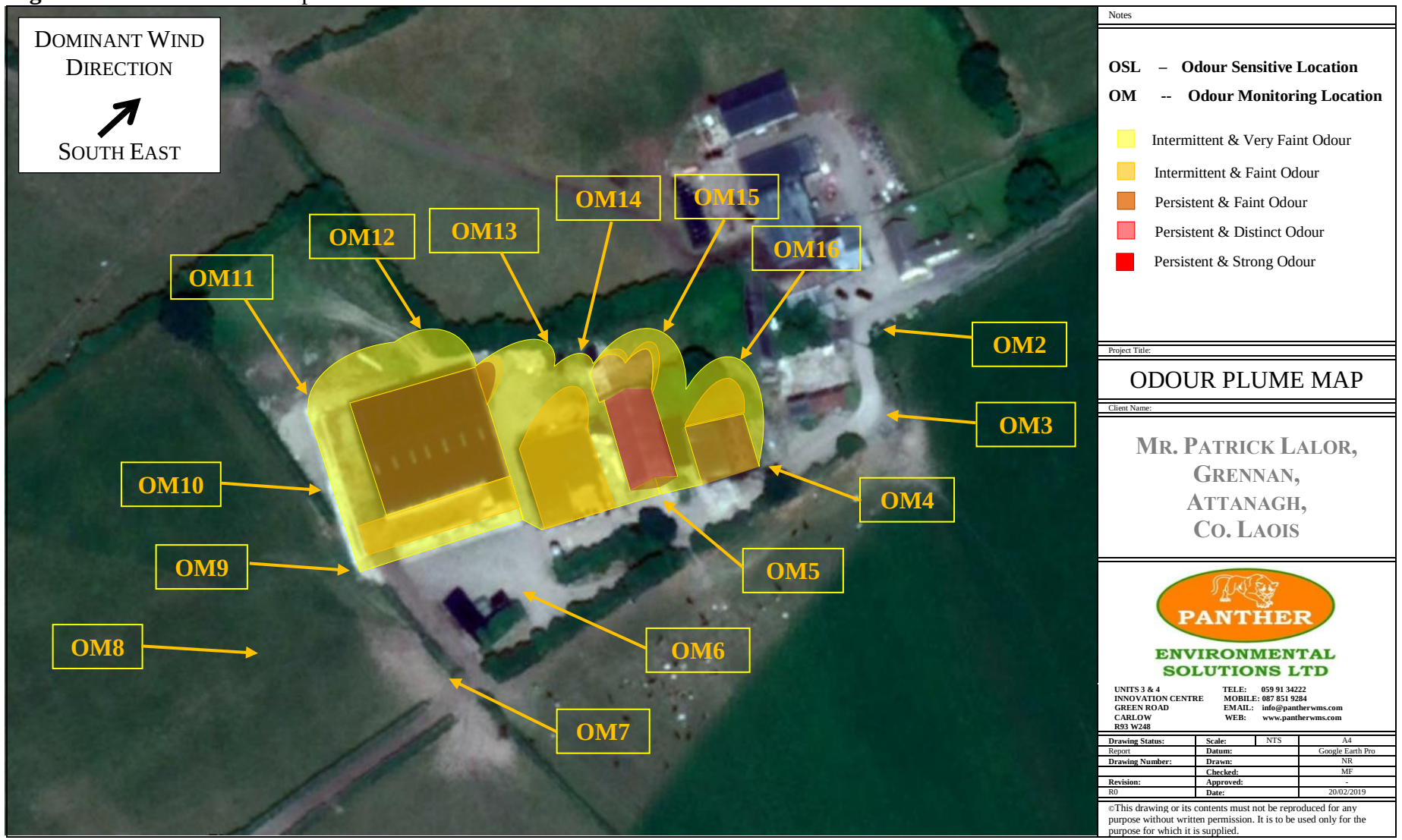

Figure A.3: Odour Source Location Map

Notes

OS1 Collecting Yard
OS2 Feed Trough
OS3 Calving/Bedding Area
OS4 Slatted Tank
OS5 Slatted House #1
OS6 Slatted House #2
OS7 Silage Pit No.1
OS8 Silage Pit No.2

Project Title:

ODOUR SOURCE MAP

Client Name:

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Report	Datum:		Google Earth Pro
Drawing Number:	Drawn:		NR
	Checked:		MF
Revision:	Approved:		-
R0	Date:		20/02/2019

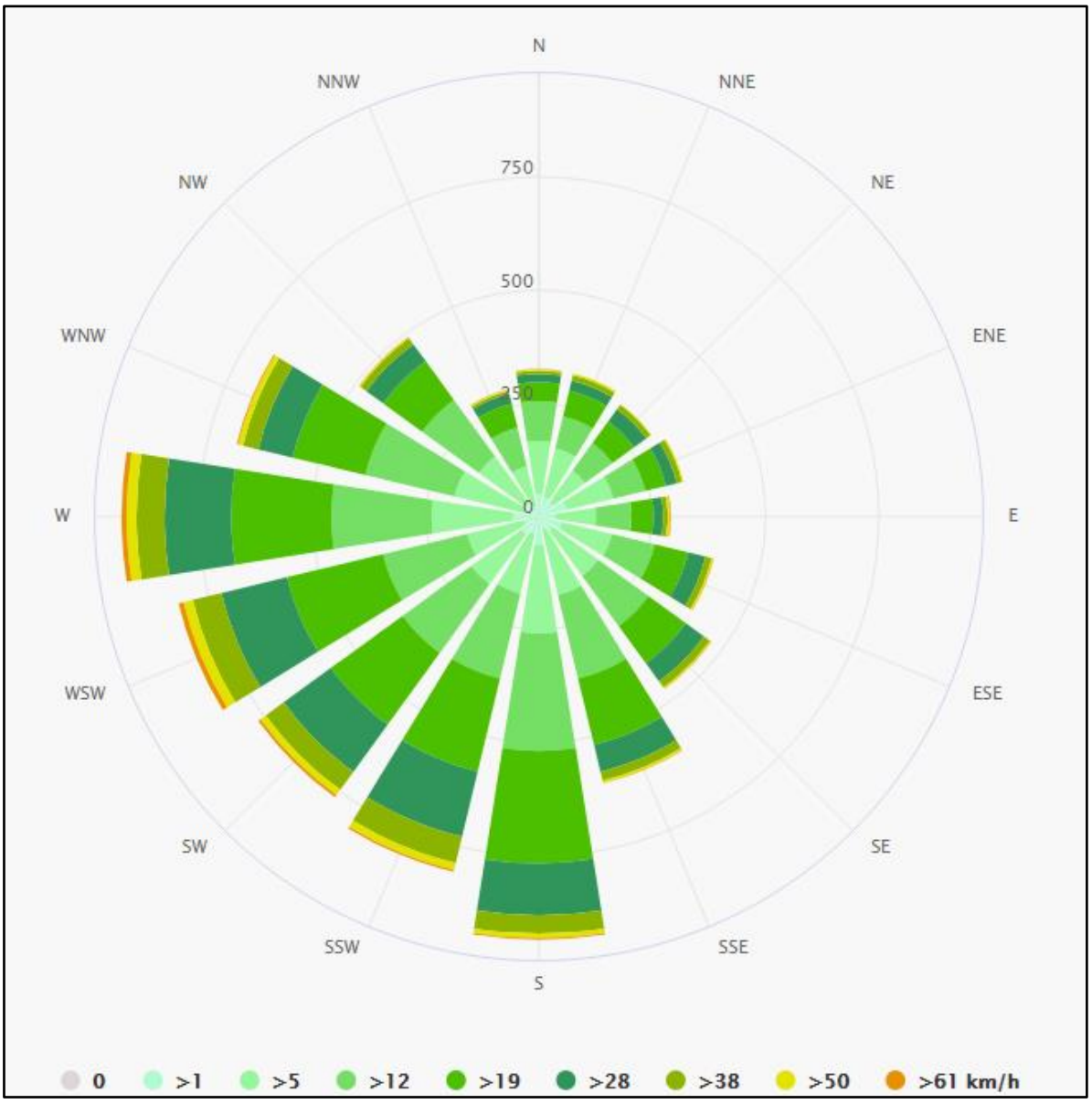
Figure A.4: Odour Sensitive Receptor Map

APPENDIX B
- KILKENNY CITY -
- WIND ROSE DIAGRAM -

The wind-rose diagram is divided into 16 cardinal directions; north (N), NNE, etc.

The length of each sector indicates the wind direction frequency for each cardinal direction.

The colour coded lines subdivide the overall frequency of wind into the proportions at a given wind speed (in km/h) in each cardinal direction. Each wind-speed frequency is additive upon the previous wind-speed frequency percentage.



APPENDIX C

- ODOUR SOURCE PHOTOS -

Figure OS1: Collecting Yard

Figure OS2: Feed Trough

Figure OS3: Calving/Bedding Area

Figure OS4: Slatted Tank

Figure OS5: Slatted House #1

Figure OS6: Slatted House #2

Figure OS7: Silage Pit No.1

Figure OS8: Silage Pit No.2