

Odour Management Plan
P00447-01 Ballynameelagh Site

Ashleigh Farms Ltd

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Prepared by



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1.0 Introduction

1.1 Background

CHC Environmental Solutions Ltd has been commissioned by Jason McGrath of Ashleigh Farms Ltd, the client, to carry out odour assessment monitoring on their pig farm located at Ballynameelagh, Cappagh, Waterford, Ref EPA License P00447-01 and to prepare an odour management plan, to be implemented at the site.

1.2 Objectives

The objectives of this project are to:

- Complete baseline odour assessment monitoring the Ballynameelagh pig farm, owned and operated by Ashleigh Farms Ltd;
- Develop an Odour Management Plan for implementation at the site.

1.3 Limitations

The limitations of this report are presented in Appendix A. All acronyms used within this report are defined in the Glossary presented in Appendix B.

1.4 Confidentiality

CHC Environmental Solutions Ltd has prepared this report solely for the use of the Client. Should any third party wish to use or rely upon the contents of this report, written approval must be sought from CHC Environmental Solutions Ltd; a charge may be levied against such approval.

2.0 Methodology

2.1 Desk Based Review

A desk-based review was made of the relevant documentation including:

- The relevant IE license(s) for the sites;
- EPA Site Visit Report 2018, Site Visit Reference No. SV15941;
- Odour related records for the site;
- Odour Impact Assessment Guidance for EPA licensed sites (AG5), and
- Odour Management Guidance from the UK Environment Agency.

2.2 Odour Field Assessment

An odour Field Assessment was undertaken in accordance with the EPA Air Guidance Note 5 “Odour Impact Assessment Guidance of EPA Licensed Sites”.

The assessment was conducted on the 5th of May 2019 by an CHC Environmental Solutions Environmental Consultant who was in fit condition and adhered to the rules for odour investigations outlined in the EPA’s Guidance Note 5.

3.0 Site Setting

The overall area of the Ballynameelagh site is approximately 2.8 hectares (ha).

The site is directly bordered in all directions by agricultural land. The site is accessed to the North by the local access Ballnameelagh Road. The Blackwater River SAC is located approximately 1km north of the site. St James Church is located approximately 350m and the EPA licensed waste facility W0245 Molaisin Compost Ltd is located 2.8km, both to the west of the site. The Roadstone operated quarry site is located <1km east of the site.

The site can be broadly divided as follows:

- Animal fattening houses are located in a central area of the site as well as to the north, west and south;
- Animal weaning housing is located in the central area of the site;
- Dry sown housing and farrowing housing are located to the west of the site;
- An above ground slurry storage tank and anaerobic digester, including an additional above ground slurry storage tank are located to the south of the site.

Site location, layout maps and monitoring Locations are presented in Appendix D.

Sensitive receptors are presented in Appendix D and Table 3.1:

Table 3.1: Sensitive Receptors, as listed in P0447-01 and Related Monitoring Locations

Sensitive Receptor (SR)	Description	Position in relation to site	Related Monitoring Location
SR A – E	Multiple Residence	NW of site, 360-380m	Point A/B
SR F	Single Residence	N of site, 585m	Point B
SR G	Single Residence	MW of site, 490m	Point A
SR H	Single Residence	E of site, 295m	Point D
SR I	Single Residence	NE of site, 495m	Point C
SR J	Single Residence	SE of site, 660m	Point E
-	Field	NE of site, >550m	Point F
-	Field	NW of site, 550m	Point G

4.0 Odour Assessment Results

4.1 Odour Field Assessment

The full results of the odour field assessment are presented in Appendix C. Monitoring locations are presented in drawing A1c, Appendix D.

Of the 7No. locations assessed during the odour field assessment, no site related odours were detected at 5No. of the locations, (A, B, D, F and G as shown on Drawing A1c, Appendix D). These are located upwind, cross wind and downwind of the site.

A moderate intermittent odour was detectable at Point C. This is located cross wind from the site, which is estimated to be 285m east of the monitoring location. This location was chosen as it is midway between sensitive locations I and H. The odour is similar in nature to that arising from pig slurry.

A faint intermittent odour was detectable at Point E. This is located directly downwind of the site, assuming prevailing wind conditions. However, on the date of the assessment localised conditions confirmed that the wind was blowing from the south west when odour monitoring was being undertaken at this location. This location is estimated to be approximately 330m down wind of the site and was chosen as it is midway between sensitive receptors H and J.

4.2 Odour Emissions Field Assessment

A site walkover was conducted following the off-site odour assessment. 13No. potential odour sources were identified during this site walkover as shown in Table 4.1. It is important to note that this assessment is a snapshot of conditions on the day of the survey and conditions on another day could be different.

Table 4.1 Odour Source Field Assessment – Ballynameelagh Site

Source	Odour Description	Odour Emission Mechanism
Pig Feed Bin (outside)	None detected	Feed bin closed; no feed being dispensed at the time of the assessment.
Animal Fattening Housing (northern boundary), slurry extraction point	None detected	Slurry extraction point located on the northern boundary of the fattening houses
Animal Fattening Housing (eastern boundary)	Moderate intermittent pig slurry odour	6No air outlet on eastern face of the fattening house
Animal Fattening Housing (southern boundary)	None detected	5No roof mounted exhaust fans on fattening house
Weaner housing (centre of site)	None detected	8No roof mounted extractor fans
200K gallon above ground slurry storage tank	Strong persistent pig manure odour detected in this area – advised that a localised slurry spillage had occurred the previous day in this area	Slurry level reported to be low in the tank at the site of the assessment.
300K gallon above ground slurry storage tank, associated with anaerobic digester unit	Strong persistent pig manure odour detected in this area – advised that a localised slurry spillage had occurred the previous day in this area	Slurry moving to the digester
Anaerobic digester unit	Strong persistent pig manure odour detected in this area – advised that a localised slurry spillage had occurred the previous day in this area	Slurry moving to the digester
Animal Fattening Housing (north of the above ground slurry storage tank)	Strong persistent pig manure odour detected in this area – advised that a localised slurry spillage had occurred the previous day in this area	Roof mounted extractor fans. Slurry extraction point also located in this area. No extraction being undertaken on the day of the assessment
Farrowing Houses	None Detected	Roof mounted extractor fans.
Dry sow house	None Detected	Building ventilation
Dry sow house	None Detected	Animal feed bins located to the west of the dry sow house
Dry sow house	None Detected	Slurry extraction point. No extraction being undertaken on the day of the assessment
Fallen animal store	None detected	Odours possible if not stored correctly

4.3 Odour Impact Assessment

Odour is very subjective – what is considered an offensive odour to one person may not be considered offensive by another. Five primary odour types/locations were detected at the site (see Appendix D, drawing A1b – Site Layout:

- a) animal feed storage, which is a mildly sweet odour;
- b) animal housing;
- c) pig slurry storage;
- d) Anaerobic digester slurry storage tank and digester;
- e) Fallen animal store.

A. Animal Feed Storage

Odour arising from animal feed storage was not detected during the onsite assessment. No feed deliveries or feed dispatch works were being undertaken at the time of the field assessment.

B. Animal Housing

Whilst most of the animal housing buildings are of a high specification, a number of the animal houses and associated infrastructure at the site are dated. Presently, all animal housing ventilation is controlled via a ventilation system. Slurry is stored in slatted tanks underneath the animal housing. In an effort to reduce ammonia/odour emissions at the facility, the following procedures are in place:

- a) Low protein diet for pig, proven to reduce ammonia production;
- b) 8 different feed mixes, allowing for more efficient protein/diet and emission management;
- c) an odour control agent is added to manure to reduce ammonia emissions;
- d) pig manure tankered off site in sealed tankers.

C. Pig Slurry Storage

Pig slurry onsite is stored in the first instance underneath the animals, in traditional slatted tanks. The above ground storage tank is currently used primarily as a default slurry storage facility, used mainly during winter months when slurry levels are at their peak. The above ground slurry storage tank is currently uncovered.

D. Anaerobic Digester Unit

Pig slurry can be pumped directly to the 300,000 gallon above ground slurry storage tank located adjacent to the anaerobic digester unit. The storage tank is currently uncovered. However, it should be noted that the adoption of anaerobic digestion technology has the potential to reduce onsite odour.

E. Fallen Animal Store

Fallen animals are currently stored in sealed storage bins and removed periodically from the site by an approved contractor.

5.0 Discussion & Recommendations

5.1 Discussion

No feed odour was detected at the site during onsite assessment. Feed is milled offsite and delivered in bulk to the site. The feed is stored in above ground feed hoppers onsite and dispatched as required onsite. Practical site management of feed in terms of delivery and dispatch will ensure the feed does not result in any nuisance odours.

Onsite slurry management practices are reviewed on an ongoing basis. Removal of pig manure from the storage tanks under the pig housing being a priority, thereby greatly reducing emissions from the

underfloor storage tanks. Utilising the above ground storage tank more effectively will serve to lower the temperature of the pig slurry and in turn reduce air emissions.

Once the anaerobic digester unit is operational, the daily feed stock of fresh pig slurry required to fuel the digester will help in reducing the pig slurry storage requirements elsewhere on the site.

Continued incorporation of low protein diets onsite in line with recommendations from the Danish firm, Vitfoss, an internationally recognised leader in animal nutrition. It is anticipated that up to 30% reduction in odour emissions can be achieved through effective diet management.

Finally, the addition of the slurry amendment, Active NS to all pig manures onsite, has been shown to reduce emissions onsite. This has been proven to reduce ammonia emissions by 20-25% both onsite and subsequently during land-spreading.

5.2 Monitoring

Regular odour assessments are undertaken by on-site personnel on a weekly basis at the site. These odour assessments follow the principles as laid out in the EPA Guidance note 5 "Odour Impact Assessment Guidance for EPA Licensed Sites". The EPA Guidance note describes a "sniff testing" approach to odour field assessment which requires a member of staff to use their own sense of smell to assess odours. AG5 is presented in Appendix E.

Additional off site odour field assessments should be conducted if an odour complaint is received. The results of regular assessments will be used to inform updates to the OMP and determine whether implemented mitigation measures are effective.

5.3 Complaint Response

A complaint response procedure is already in place for the Ballynameelagh and Caliso Bay sites. Odour related complaints are dealt with in accordance with conditions 4.1 and 9.2/9.3 of IE licence P0447-01 for the Ballynameelagh Site, which states:

Condition 4.1 The licensee shall ensure that all operations on-site shall be carried out in a manner such that air emissions and/or odours do not result in significant impairment of, or significant interference with amenities or the environment beyond the site boundary and at odour sensitive locations as specified in Schedule 2 (i) Odour Sensitive Locations.

Condition 9.2 The licensee shall record all incidents which affect the normal operation of the activity and which may create an environmental risk.

Condition 9.3 The licensee shall record all complaints of an environmental nature related to the operation of the activity. Each such record shall give details of the date and time of the complaint, the name of the complainant and give details of the nature of the complaint. A record shall also be kept of the response made in the case of each complaint. The licensee shall submit a report to the Agency, during the month following such complaints, giving details of any complaints which arise. A summary of the number and nature of complaints received shall be included in the AER.

The objective of this odour management plan is to:

- Complete baseline odour assessment monitoring at the Ballynameelagh pig breeding unit owned/operated by Ashleigh Famers Ltd;
- Develop an Odour Management Plan for implementation at the site.

Ashleigh Farm's complaint procedure includes the following measures specifically in relation to odour related complaints:

1. Odour complaints are documented using the complaints record;
2. An odour field assessment is conducted by relevant site personnel with the specific focus on the location of the complainant (if available);
3. An assessment of that day's operations is conducted in order to find the source of the odour(s)
4. If possible and deemed necessary, measures to reduce/eliminate the emission will be put in place; and
5. The EPA is informed of the complaint in accordance with licensing requirements.

6.0 Action Plan

Table 6.1 presents a proposed action plan for the management of odours arising on the Ballynameelagh Site. Its purpose is to act as a guideline for the implementation of the management plan.

Table 6.1: Odour Action Plan

Item No.	Source	Action to be Taken	Suggested Timeframe for Implementation
1	All	All relevant staff to be briefed on Odour Management Plan measures	July 2019
2	All	Review OMP annually and update following any relevant changes onsite	Annually
3	All	Carry out inhouse weekly odour assessments on all sites and keep a log of findings including weather conditions, wind direction and plant operation in accordance with EPA Air Guidance Note 5	Weekly
4	Pig Slurry Management	Review of slurry management practices at the site	ongoing
6	Pig Slurry Management	Active NS, slurry amendment to be added to all pig manures onsite, will further serve to reduce emissions onsite	ongoing
7	Diet Management	30% reduction in odour emissions can be achieve through effective diet management	ongoing
8	Fallen animals	Explore options for onsite disposal of fallen animals	TBC

7.0 Conclusions

This Odour Management plan will fulfil the requirements of Condition 4.2 of licences P0447-01 relating to the Ballynameelagh pig farm, owned and operated by Ashleigh Farms Ltd.

The successful implementation of this plan will allow management at the facility to manage any potential odour related issues that may arise in a proactive manner.

Two primary sources of odour from the site(s) are animal housing and pig manure storage. The results of the odour field assessment showed that depending on the daily operations and weather conditions odours from the site are potentially detectable at nearby sensitive receptors.

It is recommended that the action plan set out in Section 6.0 is implemented. Following the implementation of these measures, the effectiveness should be assessed, and this odour management plan updated.

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APPENDIX A

LIMITATIONS

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1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between CHC Environmental Solutions Ltd and the Client as indicated in Section 1.1.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current Irish and UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the EPA.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. The conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
6. CHC Environmental Solutions cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by CHC Environmental Solutions is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by CHC Environmental Solutions in this connection without their explicit written agreement there to by CHC Environmental Solutions.
7. Rather, this investigation has been undertaken to provide an Odour Management Plan and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX B

GLOSSARY

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Terms

AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EPA	Environmental Protection Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Poly Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo Ionisation Detector
QA	Quality Assurance
SGV	Soil Guideline Value
SPH	Separate Phase Hydrocarbon
Sp.TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
SVOC	Semi Volatile Organic Compound
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WTE	Water Table Elevation

Units

M	Metres
Km	Kilometres
%	Percent
% v/v	Percent volume in air
Mb	Milli Bars (atmospheric pressure)
L/hr	Litres per hour
ug/L	Micrograms per Litre (parts per billion)
ppb	Parts Per Billion
mg/kg	Milligrams per kilogram (parts per million)
ppm	Parts Per Million

mg/m ³	Milligram per metre cubed
m bgl	Metres Below Ground Level
m bcl	Metre Below Cover Level
mAOD	Metres Above Ordnance Datum (sea level)
uM	Micro metre

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APPENDIX C

FIELD RECORD SHEETS

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General	Site Reference:	Site Licence No.:		Assessment by:		Date of Assessment:
	A1 - Ballynameelagh	P0447		Assessor Name: <i>Olivia Hall</i> (other Investigator(s) Present): <i>n/a</i>		05/06/2019
Pre-Assessment Preparation	Observer is free from medical conditions (cold, sore throat, sinus trouble)?	Observer abstinence (30 mins) 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 No	Yes No	Complaint / Compliant Verification		Yes No	13 °C / Sunny with clouds
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) 1 Remote (no housing, commercial/industrial premises or public area within 500m of observation point) 2 Low sensitivity (no housing, commercial/industrial premises or public area within 100m of observation point) 3 Moderate sensitivity (housing commercial/industrial premises or public area within 100m of observation point) 4 High sensitivity (housing, commercial/industrial premises or public area within area of observation point) 5 Extra sensitive (complaints arising from residents, business and users of public areas within area of observation point)				Note 3: Weather Conditions Precipitation – dry, rained recently, drizzle, raining, foggy Temperature – cold, cool, warm, hot	
	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 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 into 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: 12:00	Do any of the odours experienced on-site match in character those recorded during the off-site survey? <i>Yes, similar odour character to off site, more intense</i>	List areas Inspected: <i>All areas</i>	What relevant activities were occurring on-site during the off-site odour assessment? <i>None</i>		
	End Time: 13:29	Potential on-site odour sources identified: <i>Uncovered slurry store, feed bin & animal housing</i>				

Parameter	Observer Location		Wind (nd = if not detectable)			Time		Odour Rating		Odour Description Comments Description of any odours, other source(s) of odours etc, (Also note variable weather conditions etc):
	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)	
Thresholds that could indicate nuisance	---	≥3	---	Down-Wind Approx DW or not detectable etc	---	---	---	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	Point A - Sensitive Location E/D	3	ND	U	2	12:00	5min	0	0	-
	Point B - Sensitive Locations A/B/C	3	NW	U	2	12:06	5min	0	0	-
	Point C - Sensitive Location I	3	NE	C	1	12:11	5min	1	2	up to 2m/s wind speed
	Point D - Sensitive Location H	4	NE	D	1	12:16	5min	0	0	0-1.2m/s wind speed
	Point E - Sensitive Location J	3	SW	D	1	12:20	5min	1	1	up to 2m/s wind speed
	Point F	3	NE	D	1	12:29	5min	0	0	>500m from site. Up to 2m/s wind speed
	Point G	3	NW	C	1	12:38	5min	0	0	550m to site. Up to 1.5m/s wind speed
	Point H	Onsite	ND	Onsite	1	12:56	5min	0	0	Onsite; background odour
	Point I	Onsite	NV	Onsite	1	12:58	5min	0	0	Onsite; background odour
	Point J	Onsite	N/NW	Onsite	1	13:00	5min	1	2	Onsite; background odour
Point K	Onsite	NW	Onsite	2	13:02	5min	2	3	Onsite; background odour	
Brief details of any meeting with local residents/complaints received during assessment (include names/addresses/telephone numbers etc) AND/OR Notes: U = Upwind; C = Crosswind; D = Downwind										

Parameter	Observer Location		Wind (nd = if not detectable)			Time		Odour Rating		Odour Description Comments
	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)	
Thresholds that could indicate nuisance	--	≥3	--	Down-Wind Approx DW or not detectable etc	--	--	--	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	Point L	Onsite	NW	Onsite	1	13:04	5min	1	1	Onsite; background odour
	Point M	Onsite	NW	Onsite	2	13:07	5min	0	0	Onsite; background odour

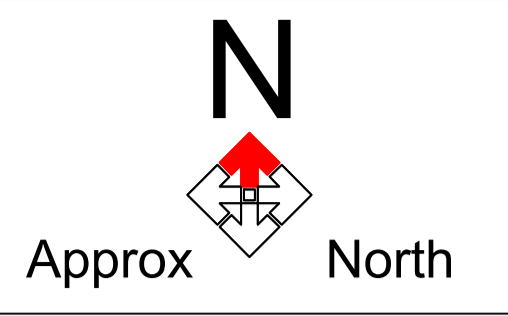
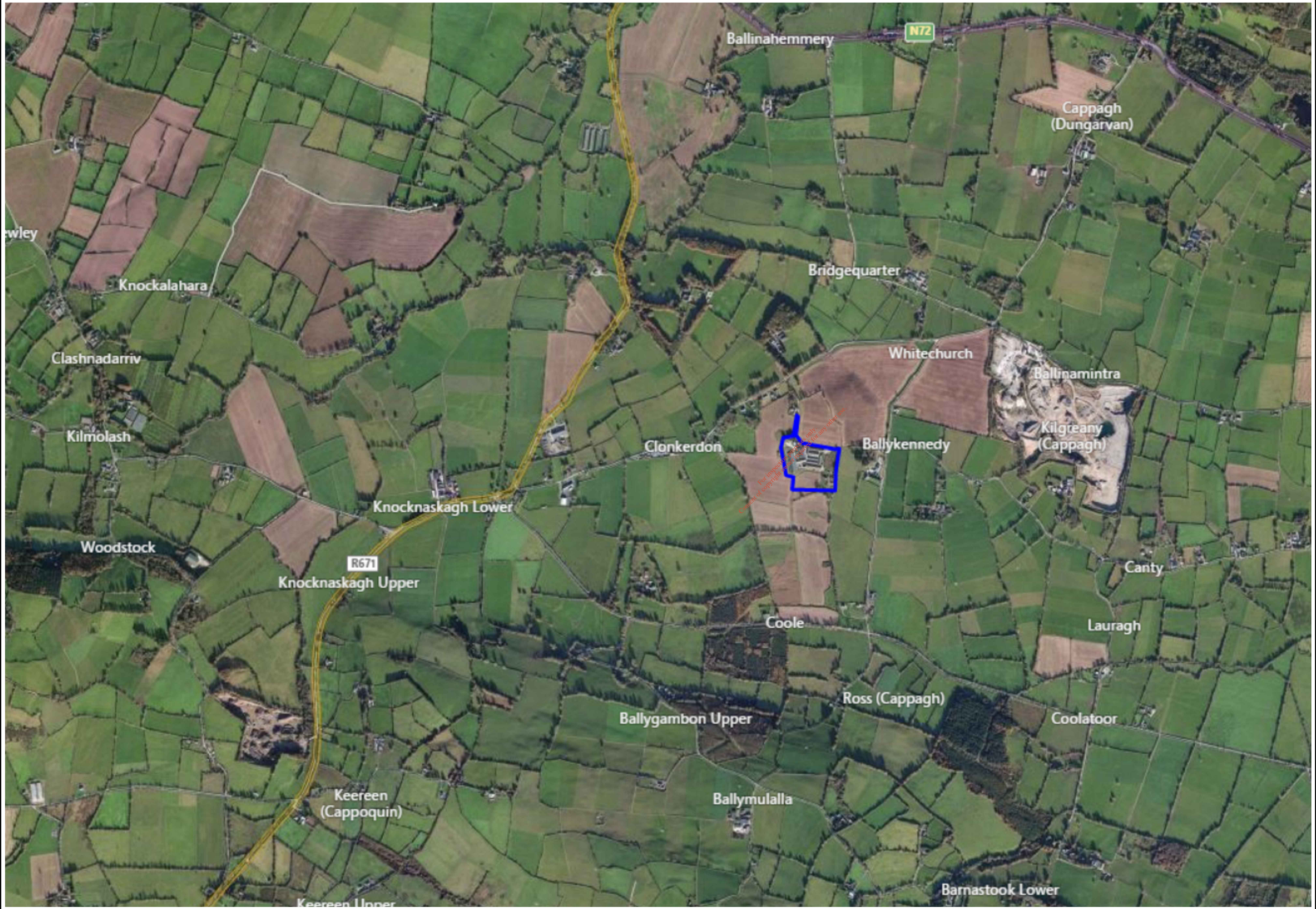
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Brief details of any meeting with local residents/complaints received during assessment (include names/addresses/telephone numbers etc) AND/OR Notes: *U = Upwind; C = Crosswind; D = Downwind*

APPENDIX D

DRAWINGS

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Key

Notes

Drawing Not to Scale

Client

Ashleigh Farms Ltd.

Project

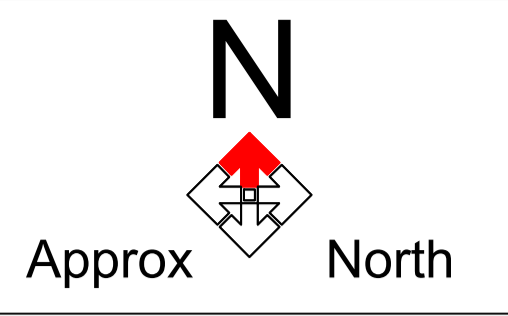
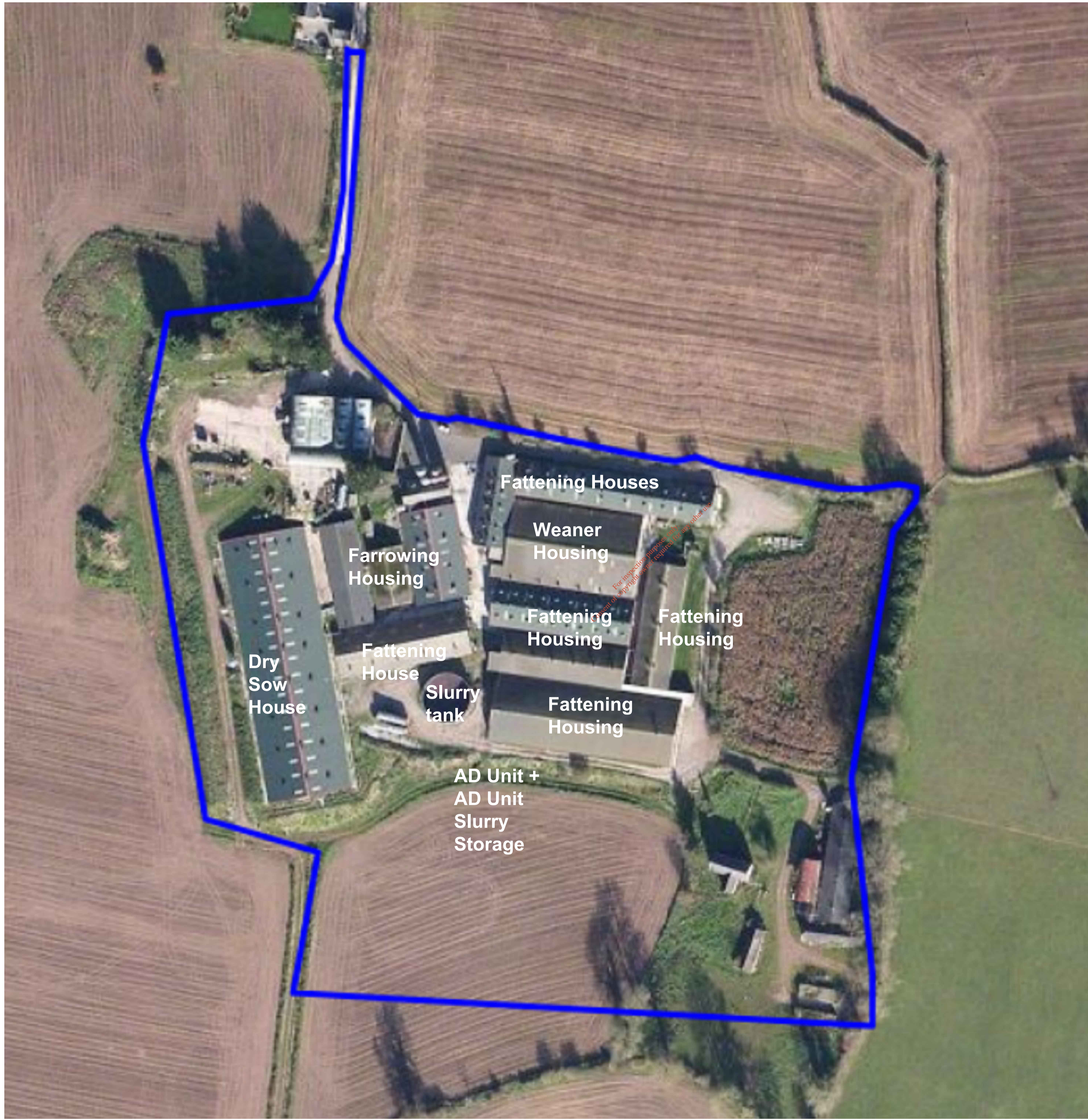
Odour Management Plan, IPC Licence P0447 - Ballynameelagh

Title

Site Location



Drawn By	Checked	Approved
RT	OH	OH
DWR no.	Date	Scale
A1a	23/06/19	n/a



Key

Notes

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Client

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Project

Odour Management Plan, IPC
Licence P0447 - Ballynameelagh

Title

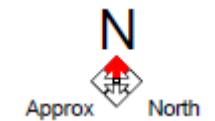
Site Layout



Drawn By	Checked	Approved
RT	OH	OH
DWR no.	Date	Scale
A1b	18/06/19	n/a



Key



Notes

Drawing not to scale

CLIENT

Ashleigh Farms Ltd

PROJECT

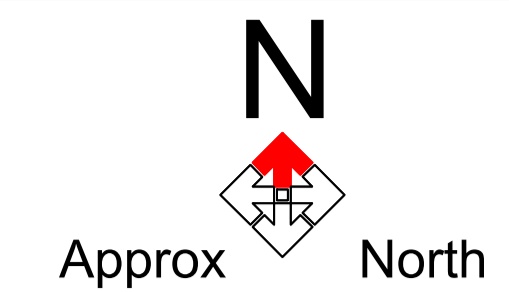
Odour Management Plan, IED
License P0447-01 -
Ballynameelagh

TITLE

Odour Monitoring Locations



Drawn by	Checked	Approved
RT	OH	OH
DWR No.	Date	Scale
A1c	24/06/19	N/A



Key

Notes

Drawing Not to Scale

Client

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Project

Odour Management Plan, IPC Licence P0447 - Ballynameelagh

Title

Local Sensetive Receptors



Drawn By	Checked	Approved
RT	OH	OH
DWR no.	Date	Scale
A1c	23/06/19	n/a

APPENDIX E

EPA AIR GUIDANCE NOTE AG5

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Environmental Protection Agency

Office of Environmental Enforcement (OEE)

**Air Guidance Note 5 (AG5)
Odour Impact Assessment Guidance for
EPA Licensed Sites**

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Preface

The Office of Environmental Enforcement (OEE) is one of the five offices in the Environmental Protection Agency (EPA). The OEE's functions include the regulation of activities licensed under the EPA and Waste Management Acts. It is the policy of the OEE to provide information and advice, via published guidance, to those it regulates, to secure environmental improvements while ensuring value for money.

This Odour Impact Assessment Guidance for EPA Licensed Sites (AG5) is one of a series of guidance notes that the OEE has planned on the general theme of air pollution monitoring.

Other documents in this series are:

Air Guidance Note 1: Guidance Note on Site Safety Requirements for Air Emission Monitoring (AG1)

Air Guidance Note 2: Air Emissions Monitoring Guidance Note #2 (AG2)

Air Guidance Note 3: Air Guidance Note on the Implementation of IS EN 14181 (AG3)

Air Guidance Note 4: Air Dispersion Modelling from Industrial Installations Guidance Note (AG4).

This guidance note is intended for use by holders of EPA licences (licensees), and consultants. The Agency advises licensees to have regard to this guidance when outsourcing any work relating to odour monitoring, in particular field assessments of odour impact.

Throughout the guidance note there are examples given of licence conditions which are typical of those found in Irish IPPC and waste licences. In reality, licence conditions can vary somewhat from one licence to the next, so reference should be made to the current licence document for the site-specific licence condition.

This guidance note will be the subject of periodic review and amendment. The most recent version of this note is available on the Agency's website: <http://www.epa.ie/> if you have any particular queries regarding this document please contact Mr Kieran Fahey at k.fahey@epa.ie.

1. Introduction

This procedure offers a consistent and systematic approach to the assessment of odours on and in the local area of facilities and installations that are licensed by the Agency. It is intended for use by licensee's to assess their state of compliance with odour related licence conditions and to investigate odour complaints received. Its aim is to achieve consistency in the manner in which a licensee's representative(s) makes odour observations and reports on odour assessment.

The procedure described in this guidance document (Section 3) will cover the following topics:

- Odour assessment preparation,
- The assessment of odour through field observations,
- The recording of findings.

2. Background

The common licence conditions used for the control of odours include:

"The licensee shall ensure that all operations on-site shall be carried out in a manner such that air emissions and/or odours do not result in significant impairment of, or significant interference with amenities or the environment beyond the site boundary",

and/or

"The licensee shall ensure that [...] odours do not give rise to nuisance at the facility or in the immediate area of the facility. Any method used by the licensee to control any such nuisance shall not cause environmental pollution".

Failure to comply with a condition of an EPA licence is an offence under the EPA and Waste Management Acts (for IPPC and waste licences respectively). Under these legislative documents *odour nuisance = pollution*.

By using this procedure, licensee's can gain information regarding compliance with relevant licence condition(s). However, it is possible that those generating odours and those being impacted, nuisanced or annoyed by them will not share opinions on the extent of the problem. The findings of odour investigators working on behalf of a licensee may differ with the experiences of complainants. Notwithstanding this, this procedure provides the basis for a consistent and systematic approach to odour assessment and reporting.

This guidance document describes a method of odour assessment through sniff testing at suitable locations in the local area of a facility or installation. Sniff testing is the use of the human nose to assess odour and is the most common form of odour monitoring. The odour investigator goes to a chosen location and stops and smells the air there for a period of time (See Section 3). When properly undertaken on a regular basis, the results of sniff tests can be used to support, or otherwise, the evidence of nuisance complaints by members of the public.

2.1 Odour

For the purposes of this guidance, odour is the property of a substance that activates the human sense of smell. The human olfactory system is a sensory system used for the detection of odours. It is highly sensitive and as such is capable of detecting extremely low concentrations (fractions of a part per billion) of a wide range of odorous chemicals.

2.2 Odour Impacts

Odour sensing olfactory cells are linked to areas of the brain that control emotions and memory processes. Offensive odours can therefore have impacts on the health and well being of humans, especially if one is subjected to the odour for extended periods of time. At sufficiently high concentrations odorous compounds may have a direct effect on human health. Also, an individual's health may suffer indirectly due to stress associated with odour impact.

People that have complained to the Agency about nuisance odours from IPPC or waste facilities have described how their quality of life has deteriorated as a result of experiencing an odour. Complainants have described the following scenarios that have occurred entirely due to nuisance odours:

- Vomiting,
- Headaches,
- Nausea,
- Stress, anxiety, frustration,
- Having to leave home and stay with family/friends or incur the expense of a hotel,
- Unable to open windows during summer time,
- Unwilling to host guests due to embarrassment,
- Keeping children indoors during summer holidays,
- Unable to enjoy the garden for occasions, (such as barbeques or birthday parties)
- Unable to hang laundry out to dry,
- Children unable to sleep due to odour in bedrooms,
- An additional discomfort for infirm elderly people.

For many complainants it is not only when they are subjected to odour that they are affected. Complainants can experience ongoing anxiety and stress due to the potential for reoccurrence of odour at any time. This can happen to people when they are frequently subjected to nuisance odours.

The majority of complaints that the Agency receives regarding licensed IPPC and waste sites relate to nuisance odours.

2.3 Odour Sensitivity

Due to the complex nature of odour perception by the human olfactory system, levels of sensitivity to odour within a population will vary. Consequently, the perceived offensiveness of an odour will vary from person to person. In addition, the context in which the odour occurs will affect the nuisance value of the odour. For example, an odour detected during a special occasion or during a period of illness may cause more nuisance than the same odour detected on another day. See section 3.8 of this document for guidance on sensitivity amongst odour investigators.

2.4 Measurement

Analytical

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.

Dynamic olfactometry

As the objective of this guidance is to assess licence compliance *beyond the site boundary and in the immediate area of the facility/installation*, determination of odour concentration by dynamic olfactometry as prescribed in EN 13725:2003 is not considered by the Agency to be a suitable assessment approach.

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), but sampling air beyond a site boundary for olfactometry purposes is highly unlikely to be representative of odour impact. Also, the sampling and analytical requirements as prescribed in EN 13725:2003 may be considered unsuitable for frequent and routine odour assessments. For these reasons it is not considered a suitable assessment approach in the context of this guidance note's objective.

Sniff testing

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

2.5 Limitations

The credibility of licensee odour monitoring i.e. self-assessment, may be questioned for a number of reasons:

Perceived Self-interest Bias: The public may perceive an inherent bias on the part of the licensee in undertaking this form of self-assessment odour monitoring. Therefore the Agency will continue to undertake odour assessments at licensee's facilities and installations. The Agency is not bound to accept any findings that a licensee arrives at following the use of this procedure.

Odour Adaption: This is a common and entirely normal desensitisation to certain odours that may affect individuals. Staff working at a site will get used to, and therefore adapt to, specific odours from the site. This adaption means that even if they try to assess the site objectively, they may not be able to do so. Individuals may not be aware that they have adapted to a particular smell because they will continue to respond normally to other odours. The manner in which adaption occurs varies amongst odours. It may take less than a second or it may take weeks to occur depending on the odour. It is not permanent and a person will begin to recover when they are no longer exposed to that particular smell, or when they are exposed to reduced levels of it. The adaption/recovery process/cycle slows with time.

Due to the odour adaption possibility of site staff, licensees may consider the use of external contractors/consultants or the use of office staff or other offsite staff who have not recently been working on the site to carry out odour assessments.

Local resident's odour adaption experience will vary from that of on-site workers. Due to odour dispersion local residents are unlikely to be subjected to the same concentrations as staff at a site, therefore adaption by the resident to an odour generated at a facility will not affect them in the same way as staff are affected. Licensee staff are generally more likely to adapt to odour due to exposure to greater odour concentrations over more constant time periods.

Odour Fatigue: This differs from odour adaption in that it is believed to be exclusively associated with exposure to hydrogen sulphide (H_2S). H_2S causes rapid paralysis of nerves in the nose at concentrations of around 150 mg/Nm^3 . This results in complete but temporary loss of smell (WHO, 2003). To put this value in context, the World Health Organisation's (WHO) air quality guideline for H_2S is $150 \text{ } \mu\text{g/Nm}^3$ for an average concentration over 24 hours. This is a human health parameter and does not consider odour annoyance. To avoid odour annoyance, a 30 minute average ambient air concentration not exceeding $7 \text{ } \mu\text{g/Nm}^3$ is recommended (WHO, 2003).

Hours of Operation: Many sites are not staffed during the late evening and night-time when local residents are more likely to be in/at their homes or at their property in some manner. Compounding this is the fact that dispersion conditions can be especially poor at night. The licensee may consider the use of external contractors/consultants or an on-call staff member to provide availability to respond to odour issues.

Additional limitations include:

- The difficulty for odour investigators to witness odour incidents (especially peaks) that are short-lived or that may be infrequent, short and unpredictable.
- Peaks in odour nuisance may be due to changing dispersion conditions (wind direction/strength, turbulence) or variable, sporadic and unpredictable emissions.
- Emissions from elevated sources (stacks, chimneys etc) may travel further than anticipated and may not reach ground level until beyond the assessment location at which the odour investigator undertakes the sniff test.

- Sources of odour may be difficult to identify especially if a facility neighbours other potential sources. Additionally it can be difficult to exactly locate the source within a particular facility (large facility/diffuse sources etc).

3. Assessment Procedure

To carry out the assessment, the odour investigator uses his own sense of smell to assess whether odours are present or not at a number of locations. The odour investigator records his assessment by selecting, what are in his opinion, the most accurate descriptors from those listed in the *Assessment of Odour Impact Field Record Sheet* (Annex A).

Odour impact assessments should be carried out routinely *and* in response to specific complaints *and* in response to weather conditions likely to lead to adverse odour at sensitive receptors. As a result, the locations of the individual observations are likely to vary with each assessment (see example of possible sequence for assessment, page 11).

3.1 Odour Perception (FIDOL)

There are five elements that are commonly regarded as combining to cause the odour nuisance experience, they are: Frequency, Intensity, Duration, Offensiveness and Location. These elements are represented by the acronym FIDOL. The function of the odour investigator's odour assessment is to assess the intensity and offensiveness of the odour and to record the location where their observations were made. In doing so their observations may be deemed to be consistent or inconsistent with public complaints. Complaints by members of the public may provide evidence of frequency and duration.

If the licensee undertakes regular odour assessments at the same locations over a period of time they may gain some insight into the frequency and duration parameters, but are still unlikely to have as much awareness of them as that of a local resident who is more frequently at that location, e.g. at their home.

3.2 Participants

The odour assessment has added value if two or more odour investigators take part. This provides an option to:

A. Make "side by side" assessments. In such cases there should be no discussion about their results until the assessment is completed. Each odour investigator completes their own *Field Record Sheet* (Annex A).

B. Alternatively one odour investigator may visit the suspected source of the odour while a colleague conducts the assessment in the local area. Thus, the timing of process events may be linked to the off-site perception of odour.

3.3 Odour Assessment Preparation

The odour investigator must be in a fit condition and adhere to the following rules:

- If he has a cold, sore throat, sinus trouble etc he should not carry out the assessment,
- The odour investigator should not smoke or consume strongly flavoured food or drink, including coffee, for at least half an hour before the assessment is carried out,

- The consumption of confectionery or soft drinks should be avoided immediately before and during the assessment,
- Scented toiletries, such as perfume/aftershave should not be applied immediately before or during an assessment,
- The vehicle used during the assessment should not contain any deodorisers or air fresheners.

The odour investigator should consider the purpose of the odour survey and:

- Have regard to the weather forecast for the area, including wind strength and direction, barometric pressure, rainfall, temperature and humidity. Weather forecasts are available from <http://www.met.ie/>. On-site meteorological stations or wind socks should always be appropriately located so as to provide a reasonable indication of the prevailing wind direction and not be significantly influenced by local structures/trees or other obstacles,
- Have regard to the recent complaints pattern (statistics),
- Have regard to the odour history of the site,
- Be aware of current activities on-site.

The following documents should be brought on the field assessment:

- The *Assessment of Odour Impact Field Record Sheet*,
- This procedure (optional),
- A scaled map of the area is most valuable to the recording process and should be used whenever possible. The map should show compass directions (Optional),
- Any other relevant documents such as a copy of the facility/installation licence.

The following equipment may be employed to assist in the field assessment:

- Wind directional instrument,
- Wind speed instrument,
- GPS device,
- Compass.

3.4 Field Assessment of Odours

The *Assessment of Odour Impact Field Record Sheet* shall be used to record field observations, see Annex A. The assessment involves the odour investigator walking or driving, as far as access allows, to the chosen assessment locations. The selection of suitable odour assessment locations will depend on whether the odour investigator is:

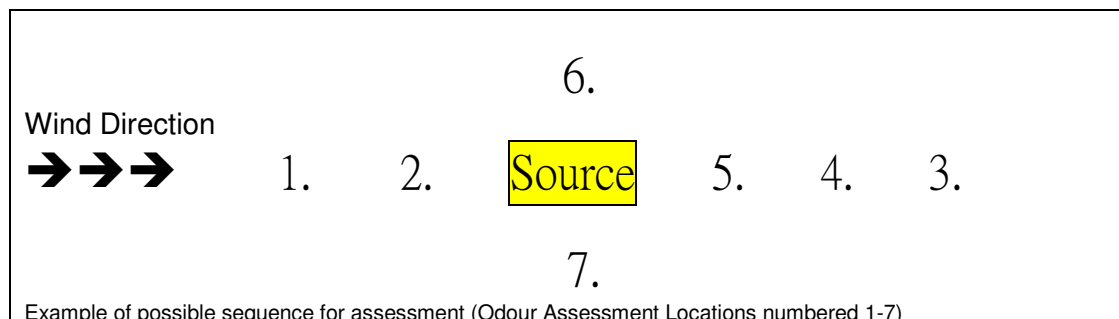
- Responding to a complaint,
- Checking the state of compliance at sensitive receptors,
- Attempting to establish the source of an odour.

Wind direction will also affect suitable location selection.

The licensee may choose fixed odour assessment locations so as to evaluate the changing situation over a period of time (days, weeks, months). Or the odour assessment locations

may vary from assessment to assessment according to local conditions, which may help to identify worst-case conditions.

When the assessment is being carried out routinely (as opposed to complaint investigation) the following sequence of sampling stations is recommended:



There is no set scale to the above locations. Rather this depends on such factors as:

- Proximity of sensitive receptors,
- Local topography,
- Availability of suitable access,
- Source characteristics (e.g. stack height, area source, fugitive source etc), etc

Selection of unsuitable locations (in the Agency's opinion), e.g. locations unreasonably far away from the facility or installation, will be detrimental to the credibility of any results obtained.

When the assessment is being carried out in response to a specific complaint, if time permits the starting point should be upwind of the suspected source prior to visiting the complainant.

In instances where no obvious wind direction is detectable or where it is variable, this should be noted in the appropriate section of the *Field Record Sheet*. Selecting suitable assessment locations is more difficult when wind direction is not detectable. In these cases it is preferable to postpone an assessment. However, if the assessment is needed in order to investigate a recent complaint and postponement is not an option the odour investigator should commence the assessment at the location of the complaint.

The odour investigator should not visit the suspected odour source until all the ambient observations have been completed, this will help avoid odour adaption and fatigue due to the higher levels that occur at source.

At each assessment location, the odour investigator should get out of the car (if used) and STOP AND SMELL. The period of assessment should be the same at each location (5 minutes recommended minimum). At the conclusion of the sampling period, record all the details required in the *Assessment of Odour Impact Field Record Sheet* for that sampling location. The odour investigator should also keep a note of any external activities that could be either the source of the odour, contribute to the odour, or be a confounding factor. This may be noted in the 'Odour Description Comments' column of the *Field Record Sheet* (Annex A)

When an odour is detected a determination of the extent of the odour plume may be carried out at points perpendicular to the plume axis and equidistant from the source (i.e. locations 6 and 7 in above diagram), again this is done prior to visiting any suspected odour source. These results can be plotted onto an appropriate plan or map.

If the facility or installation has a weather station in place, the weather details for the period of the assessment should be recorded. It is good practice to print this information and staple it to the completed *Field Record Sheet*.

It is important to note that all odours detected during the course of the assessment should be recorded on the *Field Record Sheet*, regardless of their suspected origin. The column titled 'Odour Description Comments' on the right hand side of page 2 of the *Field Record Sheet* allows for the recording of any additional details. For example if an odour is detected but the odour investigator suspects that the source is not the licensed site, this should be recorded here. Also, if a distinguishable mix of odours is detected, this should be recorded here.

3.5 Post Odour Assessment Site Inspection

Following an odour assessment during which a potentially nuisance or interfering odour has been recorded, an inspection of the facility or installation should be carried out by the odour investigator, in order to determine whether or not any observed odour can be linked to the site and to evaluate any potential odour producing activities or locations.

This on-site assessment should include some or all of the following activities as appropriate:

1. A walk of the downwind site boundary to verify if odours can be detected,
2. An assessment of particular areas or activities on site to verify if odours can be detected, such an assessment shall cover all possible odour sources on the site,
3. An examination of site operations to:
 - Identify practices that might give rise to odours,
 - Assess the effectiveness of any abatement equipment used at the site (bypassing abatement equipment for the purposes of sniff testing as an abatement efficiency test is not permitted).

Following this inspection it may be necessary to visit other local potential sources of odour to eliminate them as sources of the observed odour. This will be dependent on access permissions.

3.6 Safety

The odour investigator must never put himself or others at risk by attempting to sniff potentially hazardous emissions. A safe and common sense approach should be taken when dealing with strong odours. The odour investigator should not inhale deeply over any boreholes or exhausts etc. Particular care should be taken if any sulphuric (rotten eggs) odours are perceived.

3.7 Reporting

The person(s) undertaking the odour assessment must record their findings throughout the assessment period on the *Odour Assessment Field Record Sheet*. This sheet contains a guide that assists with the identification of nuisance. Facility/Installation management should be immediately informed of any significant findings, i.e. presence of nuisance odour.

3.8 Sensitivity amongst Odour Investigators

A licensee's odour investigators should periodically conduct odour assessments in groups of two or more. The comparative data generated should be screened to identify those whose odour perceptions are outside the norm (i.e. particularly sensitive or insensitive).

4. Odour Recording by Complainants

If a local resident, or other party, wishes to record their personal odour experience a suitable log sheet is provided in Annex B. This *Odour Complainant Log Sheet* allows people to record odours which they have personally experienced.

5. Relevant Legislation

- Environmental Protection Agency Act 1992 (as amended).
- Waste Management Act 1996 (as amended).
- Protection of the Environment Act 2003.
- Air Pollution Act, 1987.
- S.I. No. 787 of 2005 Waste Water Treatment (Prevention of Odours and Noise), Regulations 2005.

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6. References

- ENVIRONMENT AGENCY ODOUR GUIDANCE Internal Guidance for the Regulation of Odour at Waste Management Facilities July 2002 VERSION 3.0.
- ENVIRONMENT AGENCY Technical Guidance note IPPC4, Draft Horizontal Guidance for Odour Part 1 - Regulation and Permitting.
- ENVIRONMENT AGENCY Technical Guidance note IPPC4, Draft Horizontal Guidance for Odour Part 2: Assessment and Control.
- EUROPEAN STANDARD EN 13725:2003 Air Quality- Determination of Odour Concentration by Dynamic Olfactometry.
- McKeendry, P., Looney, A. & McKenzie, A., Managing Odour Risk at Landfill Sites: Main Report, Viridis, 2002.
- NEW ZEALAND MINISTRY FOR THE ENVIRONMENT Good Practice Guide for Assessing and managing Odour in New Zealand.
- SCOTTISH EXECUTIVE Code of Practice on Assessment and Control of Odour Nuisance from Waste Water Treatment Works, April 2005.
- SCOTTISH EXECUTIVE Guidance on Statutory Code of Practice on Sewerage Nuisance, April 2006.
- VEREIN DEUTSCHER INEGIEURE (VDI) 3940 – PART 2 Measurement of Odour Impact by Field Inspection – Measurement of the Impact Frequency of Recognisable Odours Plume Measurement, February 2006.
- WORLD HEALTH ORGANISATION Air quality guidelines for Europe, 2nd ed. Copenhagen, WHO Regional Publications, European Series. 2000.
- WORLD HEALTH ORGANISATION Hydrogen Sulphide: Human Health Aspects, Concise International Chemical Assessment Document 53, 2003.

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Annex A: Odour Investigation Field Record Sheet

General	Your Reference		Site Licence No.		Assessment by		Date of Assessment			
					Your name: (other Investigator(s) present):					
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	No	Yes	No		Yes	No			
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) 1 Remote (no housing, commercial/industrial premises or public area within 500m of observation point) 2 Low sensitivity (no housing, commercial/industrial premises or public area within 100m of observation point) 3 Moderate sensitivity (housing commercial/industrial premises or public area within 100m of observation point) 4 High sensitivity (housing, commercial/industrial premises or public area within area of observation point) 5 Extra sensitive (complaints arising from residents, business and users of public areas within area of observation point)					Note 3: Weather Conditions Precipitation – dry, rained recently, drizzle, raining, foggy Temperature – cold, cool, warm, hot				
	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 4: Odour Persistence 0 No Odour 1 Intermittent (detected intermittently during the period of assessment) 2 Persistent (detected throughout the period of assessment)				
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?		
	Finish Time:	Potential on-site odour sources identified:								

Parameter	Observer Location		Wind (nd = if not detectable)			Time		Odour Rating		Odour Description Comments
	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	
Thresholds that could indicate nuisance	--	≥ 3	--	Down-Wind Approx DW or not detectable etc	--	--	--	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										
Brief details of any meeting with local residents/complaints received during assessment (include names/addresses/telephone numbers etc):										

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