Hanson UK

Padeswood Carbon Capture Storage

Odour Risk Assessment

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RSK GENERAL NOTES

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1 INTRODUCTION

1.1 Purpose

Castle Cement Limited (hereon referred to as Castle Cement) shall operate and maintain this (ORA) (in accordance with their Permit, ref. **BL1096IB**) in order to prevent, or where this is not possible, minimise the nuisance potential of odour emissions from the Padeswood site. The location of the site is such that potentially sensitive receptors lie within and near the site boundary.

1.2 Scope and Exclusions

This document is applicable to all site activities, including those carried out by employees and sub-contractors working on site. The ORA is a working document with the specific aim of ensuring that:

- Odour impact is considered as part of routine inspections.
- Odour is primarily controlled at source by good operational practices, including management control measures.
- All appropriate measures are taken to prevent or, where that is not reasonably practicable, to reduce odorous emissions to air from the factory at nearby receptors.

It is not considered necessary to undertake a formal environmental impact assessment for odour as there have been no major odour complaints received as shown in Appendix 1. This has been written in line with Institute of Air Quality Management Guidance on the assessment of odour for planning – July 2018.

1.3 Definitions

A **Competent person** is someone who has received the necessary training or has a recognised qualification and/or skill to carry out the task correctly.

1.4 Responsibilities

Environment Department

- Responsible for overall delivery of the environmental commitments of the factory whilst undertaking normal business operations and related activities.
- Liaison with environmental regulators such as the Natural Resource Wales (NRW) and other regulatory bodies in the event of an emergency.
- Assess and plan measures to minimise potential odours escaping site.
- Monitors site activities and ensures control measures are in place, including odour control.
- Keep the ORA up to date.
- Training relevant staff in responsibilities relevant to odour management.

All Staff

- Responsible for ensuring that good housekeeping measures are implemented at all time.
- Report any unexpected odours on site.

1.5 Training

All Managers, Supervisors, and anyone issuing contractor tasks will receive training on the . All staff on site will receive a Toolbox talk on the importance of being vigilant and reporting any equipment that is abnormally noisy so that it can be dealt with before it becomes an offsite issue. All staff have received environmental awareness training.

The training emphasised the need for staff to be mindful of the odour generated by the activities they are undertaking and to take measures to reduce the odour impact if needed.

2 ODOUR ASSESSMENT

2.1 Site Location

Padeswood Hall Farm, a property owned and leased to private tenants by the client, is located within the site towards the northern boundary. A second property, Padeswood Hall, is located approximately 100m west of Padeswood Hall Farm and is also located within the site.

Padeswood Hall was previously occupied as office accommodation but has been vacant for over a decade. Padeswood Drive, a minor residential road exiting from the A5118, is located within the northern perimeter of the site and is home to 12 semi-detached residential dwellings. Approximately 400m west of the northern corner of the site and approximately 200m southwest of the southwestern corner of the site are small farm holdings with several agricultural buildings and sheds. A small automotive industrial estate is located immediately opposite the main site access on the opposite side of the A5118. Otherwise, the land surrounding the site comprises agricultural fields with hedgerow field boundaries, and there are several small areas of woodland. Screening is used in areas of the site close to nearby receptors, such as the A5118 along the northern boundary of the site.

Nearby places of note and their approximate distance and direction from the site include:

- Penyffordd – 1km south west;
- Penymynydd – 1.5km west;
- Buckley – 2.1km north west;
- Pontblyddyn – 2.2km south;
- Llaog – 2.9km west;
- Mold – 5.5km west;
- Broughton – 5km east;
- Llay – 7.5km south; and
- Chester – 12.1km north east.

2.2 Identification of nearby sensitive receptor and local wind/weather conditions

Some receptors are generally more sensitive than others to odour. Domestic residences, leisure facilities, offices, schools, or hospitals can be highly sensitive to odour potential and will generally be more sensitive than industrial or commercial operations. Additionally, some individuals will be less tolerant of odours than others due to heightened sensitivity, for example, through a medical condition or exposure experience, e.g., recognising odours or experiencing regular exposure. To date, the site has received no odour complaints.

The locations for this management plan have been chosen where you could reasonably expect members of the public to be regularly present for a period of 1 hour or more. X, Y, and Z coordinates are given for each chosen receptor in Appendix 1, where Z is the

height from street level in metres (m). The location of the chosen receptors is shown in relation to the site in Appendix 2.

Local topography can affect the pattern of wind flow and distribution; however, the site is located on a largely flat area of land.

Although wind speed and direction are the most significant climatic conditions likely to affect the dispersion of odours, the effects of temperature and precipitation should also be considered. Higher ambient temperatures may increase the odour potential during the processes which use temperature. Generally, the effect of rainfall on the potential for odour emissions from the site can be positive, with the effects of wet deposition helping to reduce the distance that solid or gaseous particles can travel in the air. Natural dispersion, and therefore dilution, of odour in the air reduces the impact of any odour with distance from the source.

Weather data is taken from weatherspark.com, which compiles weather data, including cloud cover, precipitation, wind speed and direction, and solar flux from NASA's MERRA-2 Modern-Era Retrospective Analysis. This reanalysis combines a variety of wide-area measurements in a state-of-the-art global meteorological model to reconstruct the hourly history of weather throughout the world on a 50-kilometre grid.

This information also tells us that more offensive odours, such as organic odour from the effluent plant, will be less likely to escape from the site as the windier parts of the year are also the cooler months. Due to the nature of the site's activities and effluent, the cooler temperature will mean that the odour is less potent.

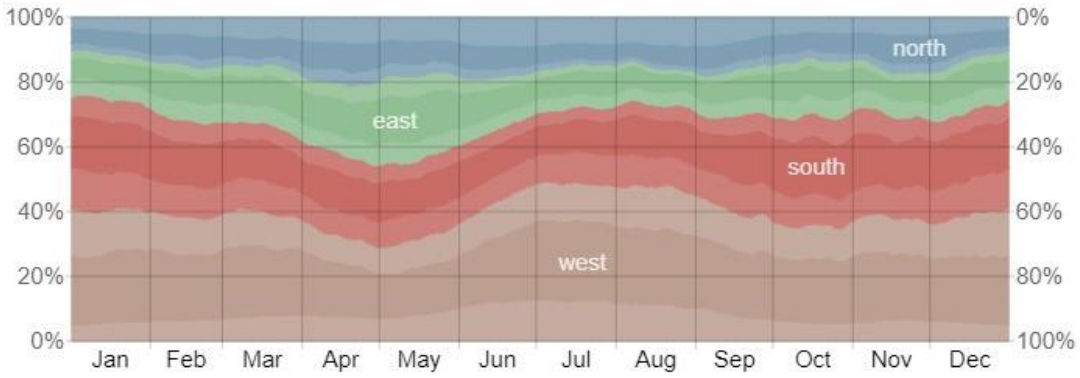

Figure 1: Predominant average hourly wind direction – Mold *The percentage of hours in which the mean wind direction is from each of the four cardinal wind directions, excluding hours in which the mean wind speed is less than 1.6 kph. The lightly tinted areas at the boundaries are the percentage of hours spent in the implied intermediate directions (northeast, southeast, southwest, and northwest).*

Weather data is taken from weatherspark.com which compiles weather data, including cloud cover, precipitation, wind speed and direction, and solar flux from NASA's MERRA-2 Modern-Era Retrospective Analysis . This reanalysis combines a variety of wide-area

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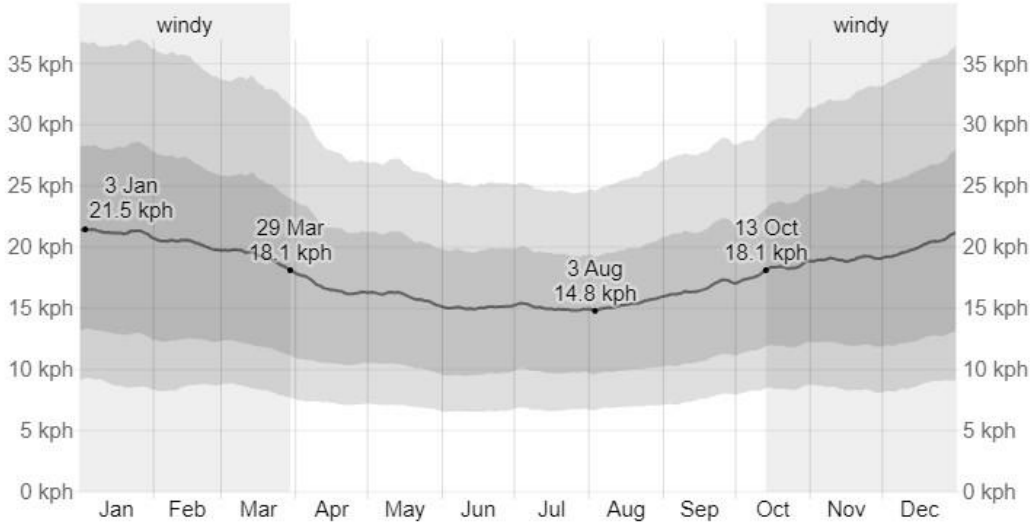


Figure 2: Predominant average hourly wind speed *The average of mean hourly wind speeds (dark grey line), with 25th to 75th and 10th to 90th percentile bands.*

This information also tells us that, more offensive odours, such as organic odour from the effluent plant will be less likely to escape from site as the windier parts of the year are also the cooler months. Due to the nature of the site's activities and effluent, the cooler temperature will mean that the odour is less potent.

2.3 Odour identification/source

The potential for malodours is considered to be fairly low from Padeswood. The processes are contained within existing buildings, and there are very little or no areas where odorous material or product is not contained or in an enclosed space. An investigation into the sources of potential odours was carried out and outlined in Table 2.

Raw materials delivered to site arrive in tipper wagons and are stored in either the crane bay or the coal shed. All fuels, conventional and alternative, are delivered by road and are stored in silos, tanks or the coal shed except for SRF, which is fed directly to the kiln from walking floor trailers. Ammonia, used for NOx abatement, is also stored in a tank.

Kiln 4 and associated equipment was designed for alternative fuels, and as such, odour abatement was installed on the MBM silo, Cemfuel tanks, and ammonia tank.

The following table highlights the potential odour sources, odour likely to arise and it's nature.

Table 1: Potential Odour sources

Source	Odour	Nature	Pattern of Release
CCP Padeswood Project			

Ammonia Storage Bullet tank	25% Ammonia Solution	Fishy	Continuous use plus deliveries
Solvent tank	≤56% KS-21 Solvent Solution	Fishy	Continuous use
70%wt KS-21 Solvent tank	70%wt KS-21 Solvent tank	Fishy	Continuous use plus deliveries
MBM silo	MBM	Dog biscuit	Continuous use plus deliveries
SRF docking station	SRF	Black bin waste	Continuous use
Ammonia storage tank	25% Ammonia Solution	Fishy	Continuous use plus deliveries
Cemfuel Tank farm	Cemfuel	Solvent odour	Continuous use plus deliveries

2.4 Pathway

In the event of failures of odour mitigation measures on site, it is possible that odour could be transported from the source to target receptors via the atmosphere. The level of dispersion is dependent on:

- Atmospheric stability.
- Wind Speed.
- Wind Direction.

The greatest frequency of events involving poor odour dispersal and odour impact thus tends to occur on cool, calm days and nights, when the temperature inversions block vertical dispersion. This is not to say, however, that odour impacts may not occur in other weather conditions.

2.5 Receptor

Malodours can a have a number of effects on sensitive receptors, including:

- General annoyance;
- Increased levels of stress;
- Loss of amenity;
- Loss of appetite and/or sleep;
- Spoiling of social activities;
- Increased awareness of perceived health effects; and

- Potential for loss of value to property and assets.

Receptors in the immediate vicinity of Padeswood are a mixture of residential, and service in nature as stated in section 4.1.

2.6 Impacts

Table 2 contains an assessment of the source, pathway, receptor potential of the site.

Table 2: Potential odour impacts

Source	Pathway	Receptor	Probability of Exposure	Potential consequence of not managing odour	Overall risk
Ammonia Storage Bullet tank	Air - operation	R1, R4, R8, R12	Negligible risk	Risk of complaints	Negligible
Ammonia Storage Bullet tank	Air - delivery	R1, R4, R8, R12		Risk of complaints	Negligible
Solvent tank	Air	R1, R4, R8, R12	Low risk	Risk of complaints	Negligible
70%wt KS-21 Solvent tank	Air	R1, R4, R8, R12	Low risk	Risk of complaints	Negligible
MBM silo	Air - operation	R1, R4, R8, R12, R14	Negligible risk	Risk of complaints	Negligible
MBM silo	Air - delivery	Low risk	Low risk	Risk of complaints	Negligible
SRF docking station	Air	R1, R4, R8, R12, R14	Low risk	Risk of complaints	Negligible
Ammonia storage tank	Air - operation	R1, R4, R8, R12, R14	Negligible risk	Risk of complaints	Negligible
Ammonia storage tank	Air - delivery	R1, R4, R8, R12, R14	Low risk	Risk of complaints	Negligible
Cemfuel Tank farm	Air	R1, R4, R8, R12, R14	Low risk	Risk of complaints	Negligible

3 COMPLAINTS AND MONITORING

3.1 Complaints

A chart showing complaints between 2022 and 2024 can be found in Appendix 3. Padeswood received two complaints in 2022 but have not received any in 2023 and 2024.

The following process applies at all times for receiving and actioning complaints:

In the event of an odour incident or occurring on site or a complaint being received, all appropriate records will be kept in accordance with the following sections from the EMS Manual:

1. Documented Information.
2. Operational Planning and Control; and
3. Monitoring, Measurement, Analysis and Evaluation.

Any odour complaint, irrespective of source, is fully investigated. The investigation is based around the checklists for Odour Report Form and the Odour Complaint Report Form from Appendix 1 of H4 Odour Management (Published 4 April 2011). The investigation also includes visiting the area from where the complaint originated (if known) and a check on the weather conditions at the time of the complaint, generally using onsite weather station reporting. The investigation includes checks on all process activities at the time, including raw materials intake, process conditions, waste management and effluent treatment. Factory activities are recorded both on manual records and by computerised records and traceability through the factory process control system.

Investigation will be carried out and suitable response implemented in accordance with Section 3.2 of the Heidelberg Materials UK Integrated Management Systems - UKSP016 Reporting of Accidents, Incidents, and Regulatory visits document.

3.2 Monitoring

The following process applies at all times for monitoring odour on site:

Objective:

This Internal Odour Monitoring Work Instruction has been prepared to enable proactive monitoring of sources of nuisance of odour from Hanson. This helps to identify any areas requiring attention in line with the site's policy of continual improvement. It also seeks to identify any unusual sources of odour which might cause nuisance to nearby properties.

Scope:

The assessment of odour and noise has been divided between site level inspections, which take place as follows:

- Odour: each shift

Responsibilities:

Plant Manager: to ensure procedure is followed.

Quality and Environment Manager: to manage the detail of the procedure.

Other site personnel: to adhere to the requirements of the procedure. To report any equipment or activity that has the potential to cause an offsite impact to the shift manager or their supervisors.

Shift Managers: To adhere to the plan and to make decisions during abnormal conditions on the impact to offsite receptors taking appropriate corrective action where necessary.

Process/procedure:

On a weekly basis, the H&S manager performs a tour of the site stopping at locations on site. Sniff testing may be carried out at each location and the following criteria are assessed/recorded at each site and recorded on form EF-017.

a) Test Location
b) Date of Test
c) Time of test
d) Duration of Test
e) Weather Conditions
f) Temperature
g) Wind velocity
h) Wind direction
i) Odour Intensity
j) Intermittent or Constant
k) Description of Odour
l) Probable source of odour
m) Other Comments or Observations

Temperature and wind conditions are provided by the site weather station.

At this point odour is categorised according to the following scales:

Table 3: Odour scale

0 – No Odour	1 – Very Faint Odour	2 – Distinct Odour	3 – Strong Odour

If any odours reach the intensity level of 2 or above, this may trigger additional corrective actions depending on the wind and weather conditions. The Environmental Manager will report this to the Senior Leadership Team, and decisions can then be made as to the actions to be taken.

3.3 Off site checks

Investigation will be carried out and suitable response implemented in accordance with Section 3.2 of the Heidelberg Materials UK Integrated Management Systems - UKSP016

Reporting of Accidents, Incidents and Regulatory visits document. Odour assessments may also be carried out by the Natural Resource Wales upon reciept of complaints to the local officer. CAR forms would then be received by Hanson and investigated thoroughly.

3.4 Incident reporting

Incidents shall be reported using the Heidelberg Materials UK Integrated Management System (IMS) UKSP016.GF1 Incident Investigation Form.

4 ODOUR CONTROL PROCEDURE

Odour emissions from the factory are categorised as “Less Offensive”. This category has been determined from H4 Odour management EA guidelines (Published 4 April 2011).

The risk of odour issues can be vastly reduced or eliminated due to the following control measures being in place or are adhered to:

Table 4: Control Measures

Source	Control Measures
Intake of raw materials	• The majority of raw materials delivered to site are dry and in bulk so as to never be out in the open • All raw materials are stored within the confines of the cement works. • The lorries are all enclosed and ensure the whole rear of the lorry is situated within the intake booth, through the plastic curtains before unloading.
Storage of raw material	• Raw materials are stored in silos, tanks, or coal shed. • Ensuring storage areas are properly enclosed to prevent the escape of odours.
Waste storage	• Waste materials are managed according to strict protocols to minimise odour release • Regular inspections and maintenance of storage facilities.
Amines production	• Amines used in production are handled and stored in closed systems. • Any emissions are controlled using appropriate abatement technology.
Ammonia storage	• Ammonia will be stored in a dedicated tank with proper containment measures. • Regular monitoring and maintenance of ammonia storage systems.

In addition to these the following general control measures are in place on site:

- An Environmental Management system is in place and is certified to ISO14001:2015. The site manager will be responsible for ensuring that odour control measures outlined are adhered to.
- Complaints will be investigated as per section 3.2 of the Heidelberg Materials UK Integrated Management Systems - UKSP016 Reporting of Accidents, Incidents and Regulatory visits document.
- On receipt of a complaint the residential area would be visited and assessed immediately, or if this was not possible, then on a day with the same weather conditions and approximately same time as far as reasonably practicable.

4.1 Abnormal Operations

Abnormal situations may arise at the site during a breakdown or period of unplanned maintenance. However, the cement works has a planned maintenance regime within their Environmental Management System, which covers the whole plant as well as using external specialists and an onside maintenance team. This minimises the probability of a breakdown through good management practice. Abnormal or emergency situations to be considered include:

Table 5: Abnormal Operation measures

Situation	Control Measures
Abnormal meteorological conditions	• Monitor weather conditions and adjust operations as necessary to mitigate odour release. • Implement temporary odour abatement measures during adverse weather conditions.
Breakdown of process equipment and plant	• Planned maintenance regime to minimise the risk of breakdowns. • Rapid response protocols to repair and mitigate any odour releases during breakdowns.
Staffing issues	• Ensure adequate staffing levels and cross-training to cover key roles. • Implement contingency plans for staffing shortages to maintain odour controls.
Power failure	• Backup power systems in place to maintain critical odour control operations. • Procedures for rapid restoration of power and resumption of normal operations.
Vandalism	• Site security measures to prevent unauthorised access and potential vandalism. • Rapid response and repair protocols in the event of vandalism to odour control systems.

Where such abnormal conditions do arise that may give rise to an increased risk of odour causing a nuisance off-site, the situation will be risk assessed and appropriate measures implemented. The odour control procedure outlined in Section 4 is to be adhered to. If an odour is released from the cement plant with potential to cause a nuisance to sensitive receptors, Natural Resources Wales should be contacted and informed.

Consideration of odour and the need to control emissions commences prior to raw materials being accepted onto the site. Any new raw material is assessed, and a decision is made if this will contribute to or increase odour emissions.

5 DOCUMENT CONTROL AND REVIEW

This document is a working document that will be reviewed at least every two years to ensure that it remains relevant to site operations and to determine whether further controls or improvements can be implemented. The plan will be reviewed in the event of any substantiated odour complaints or in the event that a significant emission is known to have occurred (identified by olfactory monitoring). The plan will be reviewed and amended if required prior to the operation of the Carbon Capture Storage and Combined Heat and Power plant.

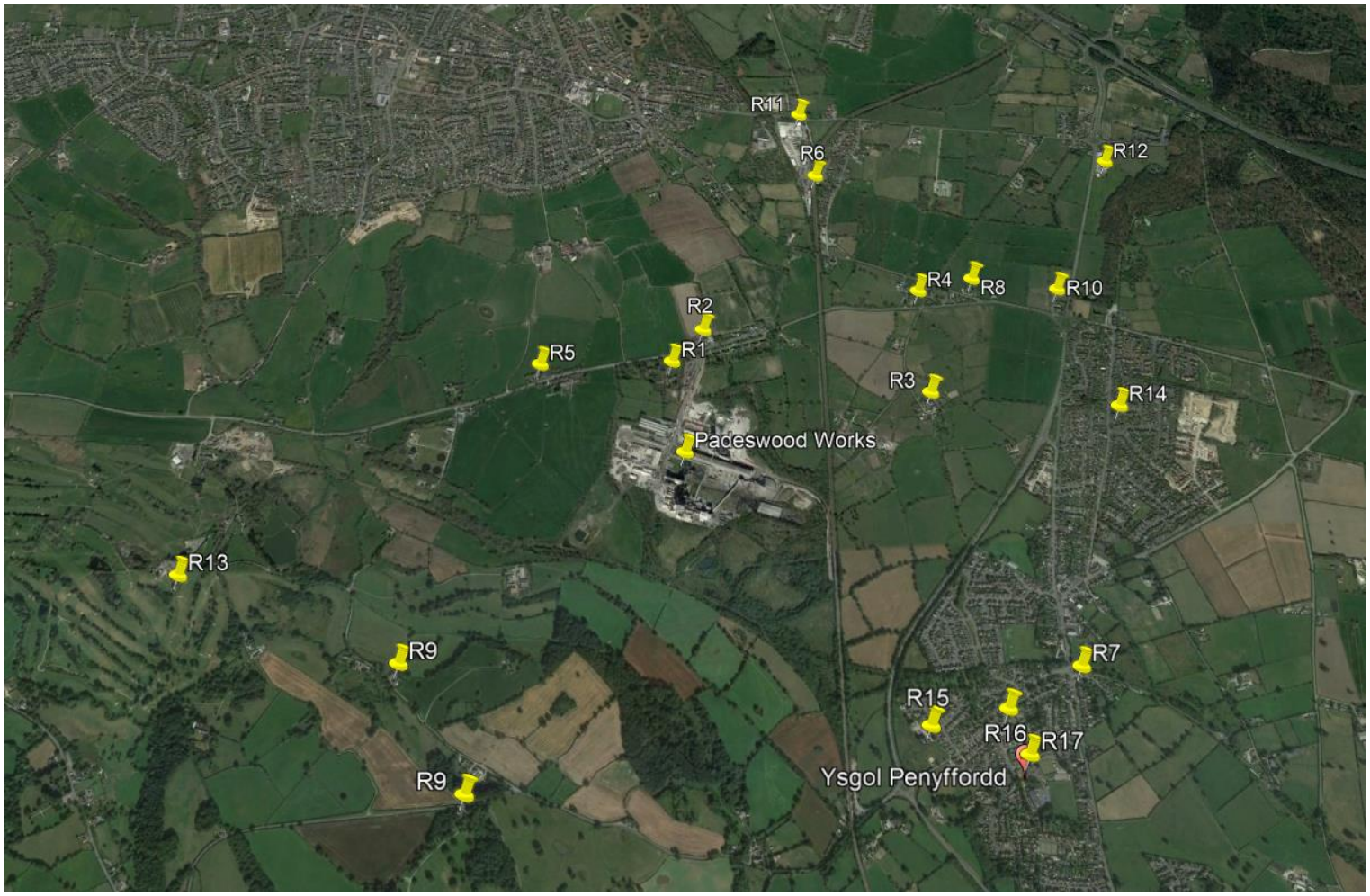
- Last review date:
- Next review due by (24 months after the last review):

APPENDIX 1 LIST OF SENSITIVE RECEPTORS

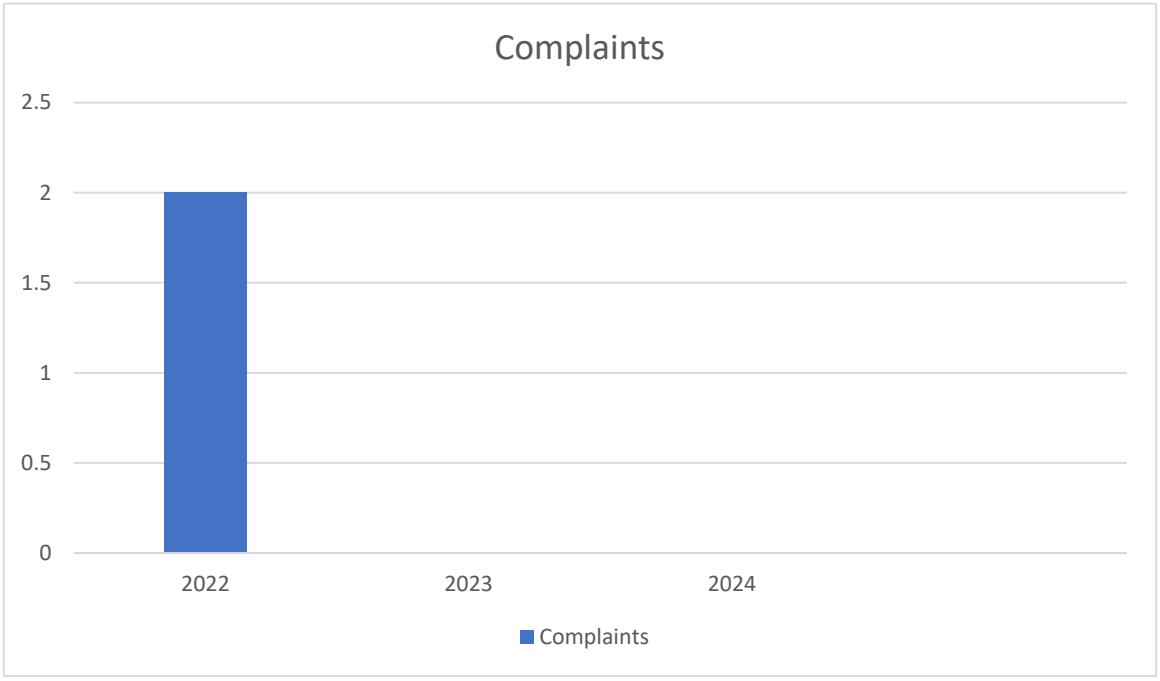
Receptor Reference	Receptor Name	X	Y	Approximate Distance from Site	General Direction from Site
R1	Padeswood Hall and Farm	329086	362512	150m	North
R2	Automotive Windscreens (business)	328577	369303	200m	North
R3	World of Friesians (horse riding school)	329888	362436	600m	East
R4	Bannel Golf Range	330351	362861	800m	North East
R5	Laburnum Cottage	328577	362533	1km	North West
R6	Buckley Train station	329537	363346	1.2km	North
R7	Penyffordd Pharmacy	330258	361439	1.2km	South East
R8	Old Whitewell Farm B&B	329806	362670	1.2km	North East
R9	Hughes Martin (Dairy Farm)	328415	361094	1.2km	South West
R10	Cross farm	330351	362861	1.3km	North East
R11	Buckley Foods (Foods Manufacturer)	329497	363623	1.4km	North
R12	The Kay Group Dobshill (Texaco). Petrol Station.	330628	363547	1.4km	North East
R13	Padeswood & Buckley Golf Club	327492	361853	1.4km	West
R14	Penymyndd residential area	330499	362407	1.5km	East
R15	Penyfford residential area	330056	361500	1.5km	South West
R16	The Red Lion Penyffordd (Public House)	329779	361315	1.6km	South East
R17	Ysgol Penyfford Primary School	330120	361153	1.6km	South East
R18	Padeswood Mound (Castle)	327509	362176	1.6km	West

R19	Mile Farm (business property)	330540	363636	2km	North East
R20	Blackbrook Farm	331017	361708	2km	South East
R21	Clawdd Offa Farn	330047	360519	2km	South East
R22	Hartsheath Counry House	328637	360345	2km	South East
R23	AF Gardner (Farm)	328415	361094	2km	South

APPENDIX 2: SENSITIVE RECEPTOR LOCATIONS



APPENDIX 3: CHART OF COMPLAINTS



APPENDIX 4 ODOUR ACTION PLAN

1. Introduction

The Odour action plan will be implemented in the event that

i. There is unacceptable odour (above intensity 3 on the odour report form or above intensity 2 for a prolonged duration of 4 hours) recorded at the facility by the Operator during the daily monitoring as described in the SP16 IMS document.

ii. A complaint is received

The timescale for implementation of the action plan will vary depending on the circumstances under which it is implemented. If an unacceptable odour is observed by site personnel there will be no delay in implementing the action plan, whereas a complaint may be received by the operator a number of hours or even days after the activity that may have contributed to the complaint has ceased. In the latter case investigation of the complaint will be based on a review of the data and observations recorded at the facility corresponding to the time at which the complainant observed the event.

2. Action plan

In the event that an unacceptable odour (above intensity 3 on the odour report form) is observed by site personnel during the daily olfactory monitoring or an odour above intensity 2 is observed at the site for a prolonged duration of 4 hours the event will be investigated immediately to determine the source as follows

- Determine from the weather conditions (as recorded on the odour monitoring form) the wind speed and direction
- Repeat the odour monitoring downwind of the initial monitoring point moving towards the facility boundary giving consideration to the location of the off-site receptors shown on the drawings presented at Appendix 1 and Appendix 2.
- Identify whether there are any other activities being undertaken at locations other than the facility and estimate the extent to which other activities may contribute to the odour observed on the facility including circumstances where odour may be transported across and/or over the facility from external sources.
- If the odour is unacceptable at the facility boundary adjacent to off-site receptors and the wind direction is from the facility towards the off-site receptors and no other potential sources of odour are identified in the vicinity of the facility actions will be taken to investigate and reduce the source of the odour including where relevant:
    - Relocation if practicable of a waste pile or portion of waste pile to a location which is not close to the facility boundary or which is not upwind of off-site receptors
    - Covering of the surface of waste pile or portion of a waste pile with a suitable cover material (such as soil) to minimise the release of odorous emissions
- The details of the actions taken will be recorded on the odour report form.

In the event of a complaint in respect of odour received from the Natural Resource Wales, Environmental Health Officer or a member of the public an investigation will be undertaken immediately to determine the source as follows:

- Review the weather data recorded on the odour monitoring form during the daily olfactory monitoring undertaken on the day of the complaint to determine whether the odour emissions are potentially a result of the operations at the facility.
- Identify from the facility diary what activities were being undertaken at the time at which the complaint event occurred and in which location at the facility and review the waste types that were accepted and handled at the facility on that day.
- Giving consideration to the wind direction, identify from the information recorded on the odour monitoring form during the daily olfactory monitoring on the day of the complaint whether there were any other activities being undertaken at locations other than the facility which may have contributed to the odour observed by the complainant including circumstances where odour may have been transported across and/or over the facility from the external sources.
- If it is established that the odour emissions were attributable to activities being undertaken at the facility, as necessary review the relevant operational procedures and implement improvements and provide additional training to site personnel and third party contractors to improve the control of future emissions.
- The action taken will be communicated to the Natural Resource Wales or Environmental Health Officer as appropriate. The nature of the complaint, the findings of the investigation and the action taken will be recorded using Form AMP2 provided in the Accident Prevention and Management Plan (AMP) at Appendix EMS14 of the EMS Manual.

APPENDIX 5 COMPLAINTS 2024 ONWARDS

Date	Time	Location	Intensity	Notes	Wind Direction