Cloughton 2 Wellsite

Odour Management Plan

Environmental Permitting (England and Wales) Regulations 2016

- **Application for a Bespoke Mining Waste Operation**
- **Application for a Bespoke Installation**
- **Application for a Bespoke Groundwater Activity**

Issue Number:	Details:	Prepared By:	Reviewed By:	Authorised By:
250207	Draft for Client Review	Tony Fildes (Zetland Group)	Jamie McGill (Europa)	Alastair Stuart (Europa)
250424	Initial issue for an Application for a Mining Waste Operation with Flare, a Mining Waste Facility and a Groundwater Activity	Tony Fildes (Zetland Group)	Jamie McGill (Europa)	Alastair Stuart (Europa)

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1 PURPOSE AND CONTEXT

This Odour Management Plan forms part of an application to the Environment Agency to authorise the undertaking of specific 'permitted activities' at the Cloughton 2 Wellsite (herein referred to as the 'Wellsite'). With regards to onshore oil and gas operations, a number of activities are considered applicable to the environmental permitting regime.

The wellsite within which the 'permitted activities' are undertaken is considered a 'regulated facility' under The Environmental Permitting (England and Wales) Regulations 2016, as amended (EPR2016) [Ref.1]. Throughout the life of the wellsite, this Odour Management Plan shall be considered a live 'operating technique' and must be complied with as it forms part of the environmental permit.

The purpose of the Odour Management Plan is to present and outline the odour management arrangements for the Wellsite and has been compiled in accordance with the requirements of the Environment Agency guidance for H4 Odour Management: *how to comply with your environmental permit* [Ref.2].

Europa Oil & Gas Limited is the 'Operator' as defined under EPR2016 and shall herein be referred to as the 'Operator' within this Odour Management Plan.

The Operator is proposing to construct a wellsite ~0.34 km southeast of Burniston, a village and civil parish in the Scarborough borough of North Yorkshire, England.

The wellsite will be constructed to accommodate the drilling of an appraisal borehole to evaluate the potential for dry natural gas accumulations within the target formations, namely the Carboniferous Sandstones (primary target formation), and the Permian Brotherton Limestone (Plattendolomite) and the Kirkham Abbey (Hauptdolomite) formations (secondary target formations).

An application to the Environment Agency is being proposed under EPR2016 to apply for a 'Mining Waste Operation and Mining Waste Facility with Fracturing and Flare' and for a 'Groundwater Discharge Activity', as defined by reference 1.8.8 and 1.3.12 respectively of the Environment Agency (Environmental Permitting and Abstraction Licensing) (England) Charging Scheme [Ref.3].

For clarity, domestic legislation derived from European Union legislation such as the Mining Waste Directive (MWD) [Ref.4] and Industrial Emissions Directive (IED) [Ref.5] continue to have an effect in domestic law following the UK's withdrawal from the European Union in accordance with the European Union (Withdrawal) Act 2018 [Ref.6]. European Directives are therefore still applicable to both this Odour Management Plan and the activities performed by the Operator.

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2 SCOPE

This Odour Management Plan is applicable to the Cloughton 2 Wellsite and all operations conducted therein in accordance with environmental permits and planning consent.

It is applicable to the 'Operator', its contractors and subcontractors and can be used to support an application to the Environment Agency for an environmental permit under EPR2016, where there is a requirement to provide an Odour Management Plan.

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3 Abbreviations and Definitions

~:	Approximately
':	Inch
AOD:	Above Ordnance Datum
AONB:	**Areas of Outstanding Natural Beauty**
BAP:	Biodiversity Action Plan
BAT:	Best Available technique
CO_2:	Carbon Dioxide
COSHH:	The Control of Substances Hazardous to Health Regulations 2002
EPR2016:	The Environmental Permitting (England and Wales) Regulations 2016, as amended
Groundwater Activity:	Has the meaning given within Regulation 2 of EPR2016
Groundwater Discharge Activity:	Has the meaning given within Regulation 2 of EPR2016
H_2S:	Hydrogen Sulphide
ha:	Hectare
HSE:	Health, Safety and Environmental
IED:	Industrial Emissions Directive
km:	Kilometre
LNR:	Local Nature Reserves
m:	Metre
Mining Waste Facility:	Has the meaning given within Regulation 2 of EPR2016
Mining Waste Operation:	Has the meaning given within Regulation 2 of EPR2016
MWD:	Mining Waste Directive.
N_2:	Nitrogen
NNR:	National Nature Reserves
Operating Technique:	Documents approved by the regulator to ensure compliance with the issued permit
Operator:	Has the meaning given within Regulation 7 of EPR2016
PCE:	Pressure Control Equipment

Permitted Activities:	Any activity or operation defined within Schedule 1 to 29 of EPR2016
Regulated Facility:	Has the meaning given within Regulation 8 of EPR2016
RSPB:	Royal Society for the Protection of Birds
SAC:	Special Areas of Conservation
SPA:	Special Protection Areas
SSSI:	Sites of Special Scientific Interest
UK:	United Kingdom
VOCs:	Volatile Organic Compounds

Table 1: Abbreviations and Definitions

4 Site Details

The proposed wellsite is located in the countryside in the county of North Yorkshire. It is centred on grid reference TA 02081 92802 and located at the following address:

Cloughton 2 Wellsite
Land east of The Mill Yard
Burniston Mill
Coastal Road
Burniston
Scarborough
YO13 0DB

Figure 1: Cloughton 2 Wellsite – Proposed (Source: Google Earth 28/08/2024)

4.1 Site Location Plan and Site Layout Plan

A number of site plans have been provided within the Site Plans document (04 – Site Plans) and detail the extent of the wellsite, including its location, site layouts and point source emissions.

A copy of the following plans are provided within the Site Plans document (04 – Site Plans).

- 04A – ZG-EOG-CLTN-EPR-04-01 Location Plan 10000 Scale A3
- 04B – ZG-EOG-CLTN-EPR-04-02 Location Plan 2500 Scale A3
- 04C – ZG-EOG-CLTN-EPR-04-03 Site Layout Plan - Indicative Construction Phase 500 Scale A3
- 04D – ZG-EOG-CLTN-EPR-04-04 Site Layout Plan - Indicative Drilling Phase 500 Scale A3
- 04E - ZG-EOG-CLTN-EPR-04-05 – Site Layout Plan - Indicative Proppant Squeeze Phase with Workover Rig 500 Scale A3
- 04F - ZG-EOG-CLTN-EPR-04-06 – Site Layout Plan - Indicative Proppant Squeeze Phase with Coil Tubing Unit 500 Scale A3
- 04G – ZG-EOG-CLTN-EPR-04-07 Site Layout Plan - Indicative Well Testing Phase 500 Scale A3
- 04H – ZG-EOG-CLTN-EPR-04-08 Extent of Mining Waste Facility Plan 10000 Scale A3

5 ROLES AND RESPONSIBILITIES

Role	Key Responsibilities
Chief Operations Officer	The Chief Operations Officer is responsible for: • Ensure suitable and sufficient systems, processes and resources are provided to adhere to legislative and other requirements; • Apply HSE Management standards and procedures throughout the project. • Stipulate project requirements and conditions, e.g. budget, time constraints, milestones and feedback; and • Ensure that a proactive and robust system is in place for the management of odour during operations.
Executive Director	The Executive Director is responsible for: • The communication and implementation of the Odour Management Plan; • The communication of the HSE Management System structure and responsibilities to the Wellsite Supervisor / Site Supervisor; • Providing assistance and guidance in the update and approval of the Odour Management Plan; • Ensuring that legislative compliance is maintained through the provision of adequate competent resources; • Ensuring that competent personnel are available to implement, monitor and assess requirements of the Odour Management Plan; • Ensuring that roles and responsibilities are identified and the assessment of individuals is recorded; • Appointing contractors who can meet internal HSE standards through a robust tendering and/or selection process and the monitoring of contractors to ensure that these standards are being met; • Assessing the competence of contractors so that they are competent and capable of carrying out their work to the required standards; • The development and training of staff or assessing the competence of contractors so that they are competent and capable of carrying out their work to the required standards; • Ensuring that emergency response procedures are developed, maintained, communicated and tested for effectiveness; and • Conducting periodic audits of compliance and communicating environmental performance, significant findings and non-conformances.

Role	Key Responsibilities
Wellsite Supervisor / Site Supervisor	The Wellsite Supervisor / Site Supervisor is responsible for: • Ensuring that leadership is clearly established and promoting a high degree of HSE awareness through communication of HSE Policies and responsibilities; • Ensuring that defined practices and processes are communicated; • Ensuring that, where required, monitoring and reporting relating to regulatory compliance is carried out; • Ensuring that odorous emissions are reported and investigated in accordance with internal HSE policies; • Ensuring that where required, odorous emissions are sampled to determine source and composition of the emission; • Ensuring that spillages are remediated as soon as reasonably practicable; • Ensuring that all incidents, involving, or having the potential to cause, injury or harm to personnel, damage to infrastructure or the environment are thoroughly investigated; • Ensuring that emergency response plans are tested on a regular basis, recording the results, identifying, implementing and communicating corrective actions; and • Ensuring that complaints are reported to the Operator and thoroughly investigated.
All Personnel	All personnel are to follow the requirements of this Odour Management Plan and cooperate fully with senior management. All personnel must take reasonable care to ensure that their actions do not have an adverse impact on the environment. Personnel must not intentionally or recklessly interfere with, or misuse anything that is provided in the interest of health, safety and the environment.

Table 2: Roles and Responsibilities

6 ODOUR MANAGEMENT PLAN

This Odour Management Plan covers the following operations to be conducted at the Wellsite:

- Drilling operations;
- Well testing operations;
- Workover operations; and
- Well abandonment operations.

6.1 Objective of the Odour Management Plan

The Odour Management Plan is designed to consider odour sources, releases and impacts of potential odours and the implementation of appropriate methods to control and minimise any potential odours.

This objective will be achieved through:

- Assessment of Risks;
- Identification of odorous materials subject to the plan;
- Arrangements for additional control measures;
- Identification of potential odour release points;
- Arrangements for controlling evaporation of odorous products;
- Arrangements for the containment of odorous emissions;
- Arrangements for the implementation of odour abatement techniques;
- Arrangements for the dispersion of odorous emissions;
- Arrangements for odour monitoring;
- Arrangements for odour investigation;
- Training of personnel;
- Audit Requirements; and
- Arrangements for reviewing and revising the Odour Management Plan.

6.2 Distribution of the Approved Odour Management Plan

The Operator will communicate the Odour Management Plan to the Wellsite Supervisor. A copy of the Odour Management Plan is to be held within the Wellsite Supervisor's office and be available for review by regulatory bodies.

The Odour Management Plan will be communicated to site personnel during site induction and a record of induction will be recorded. A copy of the Odour Management Plan will be displayed and made available on site to all personnel during operations.

6.3 Changes to Operations, Processes or Equipment

Any required changes or deviations from this Odour Management Plan are to be referred to the Operator or to the Wellsite Supervisor in the first instance.

No changes to, or deviations from, this Odour Management Plan are to be implemented until the required changes or deviations have been reviewed and approved by the Operator.

Alterations to the plan will be submitted to the Environment Agency for approval; however, alterations may be implemented as an immediate control measure to resolve an identified odour problem prior to notification to the Environment Agency.

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7 ODOUR RISK ASSESSMENT

7.1 Preliminary Odour Risk Assessment

In order to understand how the Odour Management Plan shall be applied, it is necessary to understand where the potential odour sources are likely to be generated.

A preliminary desktop-based odour risk assessment has been produced to consider all potential odours that may be generated as a result of the proposed operations relating to the Wellsite. The odour risk assessment is qualitative and details the activities and events that may lead to environmental impact on one or more receptors.

The Odour Risk Assessment (14A - Odour Risk Assessment) has assessed the potential odour risks from the proposed operations to be undertaken and includes the following information:

- Potential odour release points;
- Potential sources of odour;
- Operations being carried out which may lead to odour emissions;
- Receptors;
- Pathway;
- Probability of exposure;
- Consequence;
- Magnitude of Risk;
- Risk management to control or minimise odour release;
- Residual Risk; and
- Responsible Person for monitoring release points.

The Operator shall undertake a review of the Odour Risk Assessment once the Wellsite is completed to capture any changes that the desktop-based risk assessment has not picked up.

A copy of the Preliminary Odour Risk Assessment is included within this Odour Management Plan (14 – Odour Management Plan) provided in support the environmental permit application.

7.2 Pre-Task Odour Risk Assessment

A Pre-Task Odour Risk Assessment will be undertaken by the Operator prior to commencement of changes within the operations.

The Pre-Task Odour Risk Assessment will be undertaken to identify any alterations or changes to processes, equipment or odour control measures that had originally been assessed in the Odour Risk Assessment. This may include alterations or changes due to equipment availability or equipment replacement etc.

If alterations or changes to the Odour Risk Assessment are identified, a revised Odour Risk Assessment will be produced and communicated by the Operator.

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8 POTENTIAL ACTIVITIES RESULTING IN ODOUR

This section describes the activities that will be conducted during the proposed operations at the Wellsite and are considered to have the potential to cause odour.

For clarity, odour associated with drilling activities at other Wellsite's have not been present during previous drilling operations undertaken by the Operator.

There have been no complaints received relating to odorous emissions during previous drilling activities and therefore the activities with odour potential are anticipated to be associated with well testing activities.

Should odour become apparent, or a complaint received during drilling of the Cloughton-2 Well, then this Odour Management Plan will be revisited.

8.1 Storage of Wellbore Fluids

A number of fluids will be produced from the wells throughout operational periods. Any fluids brought to surface, which may contain reservoir fluids, will be subject to a three-phase separation process in which water / brine, hydrocarbon oils and natural gas will be separated from each other.

Water / brine will be flowed to a stock tank located onsite for storage where it may be reused at some point during the operations or marked for disposal.

Oils and/or gas condensate may also be flowed to a stock tank onsite for storage where it will remain pending collection by an Environment Agency licensed waste carrier and transported offsite to an oil refinery.

Due to the nature of the fluids and the fluids having been exposed to the conditions of the wellbore and formation, there is the potential for odour to be present within the fluids when stored at surface within the stock tanks.

For clarity, it is anticipated that well bore fluids from the Cloughton-2 Well will be dry natural gas and therefore the potential for crude oil, condensate and formation water is limited.

8.2 Gas Lift

To aid in the initial flow of hydrocarbons it is common for Nitrogen (N_2) or sometimes Carbon Dioxide (CO_2) gas to be introduced into the wellbore to displace wellbore fluids introduced during drilling or completion operations. The gas will displace any liquids in the tubing or wellbore which reduces the hydrostatic pressure and allows the well to flow.

As the wellbore fluids, N_2 / CO_2 and natural gas rise to surface they will be diverted via temporary pipework to a three-phase separator, which will separate oil, formation water and gas (N_2 / CO_2 and natural gas) from each other. Oil (including condensate) will be transferred via temporary pipework to storage tanks pending collection, with produced water being transferred via separate temporary pipework to separate storage tanks.

In the first instance, following artificial lifting, gas separated from the produced fluid will heavily consist of N_2 / CO_2, with small volumes of natural gas, and will be diverted through temporary pipework to a shrouded ground flare where the following two processes will occur should artificial lifting be used.

1. The volume of N_2 / CO_2 to be introduced into the wellbore will depend on the volume of wellbore fluid requiring lifting. Initially, the recovered gas mixture will largely be N_2 / CO_2 with entrained natural gas. The gas flow from the well will be cold vented to atmosphere via the stack for a short period of time. It is proposed to raise the calorific value of natural gas to minimise / negate any form of cold venting where possible.
2. As the lifting operations continue, the volume of N_2 / CO_2 will decrease whilst the volume of natural gas will increase. Once a suitable mix of natural gas to oxygen has been achieved (once N_2 / CO_2 has reduced and cannot blanket ignition) the pilot light will ignite the gaseous waste stream. The pilot light is always on and will ensure that no unnecessary cold venting will take place by igniting the gas as soon as it is physically possible to do so.

N_2 / CO_2 are odourless gases and therefore do not directly cause odour issues, however, as it will prevent the ignition of natural gas due to providing an 'ignition blanket', meaning that natural gas (although in small quantities) may present an issue of odour at the Wellsite albeit for a short duration.

The Operator has selected a shrouded ground flare for the incineration of natural gas which includes an auto pilot light to ensure that as soon as the mixture of natural gas and oxygen is within a combustible range, it will ignite.

It is foreseeable that odour will occur from the small volumes of natural gas comingled with the vast volume of N_2 / CO_2 . The odorous component of releases tends to be the higher hydrocarbon compounds (C6 and above) which are those with lower odour thresholds.

The cold venting of N_2 / CO_2 and small volumes of natural gas through a shrouded ground flare will provide better dispersion from the top of the burner than at surface level. Although technically possible to vent gas at higher elevations, if it were not being vented through a burner, it would not provide for the gas to ignite as soon as the combustible range was met, and would result in cold venting natural gas unnecessarily.

8.3 Incineration of Natural Gas

In general, the odorous component of releases tends to be the higher hydrocarbon compounds (C6 and above) which are those with lower odour thresholds, as well as mercaptans. The predominant higher hydrocarbon compounds present in releases are expected to be acetylene, ethyl benzene, benzene, styrene, ethynyl benzene and naphthalene.

The Operator has selected a shrouded ground flare for the incineration of natural gas which includes an auto pilot light to ensure that as soon as the mixture of natural gas and oxygen is within a combustible range, it will ignite.

8.4 Purging and Cleaning Tanks and Pipework

The breaking of containment, specifically the breaking containment of pipework and the opening of stock tanks will ideally only be undertaken at the end of operations, to limit the potential for any odorous compounds to be emitted.

Pipework which has been the subject of transporting wellbore fluids and gasses will be subject to a purging process which will use either water or N_2. However, the exact method of purging and cleaning cannot be confirmed until an appropriate contractor has been appointed.

Stock tanks will also be subject to a purging and cleaning process. The purging process will be undertaken once the tank has been emptied, most likely at the end of operations and prior to cleaning. Again, the purging and cleaning process cannot be confirmed until the appropriate contractor has been appointed.

The processes for purging and cleaning pipework and tanks will be agreed with the contractor and prior to operations commencing.

9 SOURCE MATERIALS

9.1 Use of Alternative Products

Products known to emit odour or products that may emit odour when reacting with other products will be substituted where possible, for alternative non-odorous products which are deemed safe and effective. Service providers will be asked to provide non-odorous products where possible prior to mobilisation and commencement of operations. If odorous products cannot be substituted these products will be identified prior to mobilisation and arrangements will be established for the segregation of these products during transportation, storage, handling and disposal.

If odorous products cannot be substituted, quantities and holding time onsite of odorous products are to be kept to a minimum where possible.

9.2 Identification of Odorous Source Materials

An inventory of potentially odorous products including description and quantities will be undertaken by service providers during initial mobilisation and installation. Inventories are to include all potential odorous liquid, solid and gaseous materials that have been mobilised and held onsite. Inventories of potential odorous products are to be recorded and a copy held within the Wellsite Supervisor's office.

The Wellsite Supervisor will collate service provider inventories and produce a consolidated potential odorous product inventory which will be held in the Wellsite Supervisor's office for review by external regulatory bodies.

The Wellsite Supervisor is to ensure that the odorous product inventory is updated on receipt/disposal of odorous products and a current copy is available for review.

9.3 Use of Odorous Products

If there is a requirement for the use of, or transferring of odorous products on site, control measures to eliminate or reduce potential odorous emissions detailed within this Odour Management Plan are to be followed.

These include, but are not limited to:

- Containers are to be sealed when not in use;
- Spill pads / containers shall be used to ensure spillages are contained and remediated effectively and efficiently;
- Avoid direct sunlight where possible; and
- Reduce evaporation rate by eliminating air flow and surface area.

9.4 Storage Arrangements

Storage areas will be provided onsite for equipment, chemicals, materials and waste receptacles. Storage areas will be clearly marked and site personnel informed of specific storage requirements for individual areas when receiving site induction. Specific storage areas will be provided for waste, hazardous materials (COSHH) and operational materials. Materials are to be segregated where possible and monitored for signs of degradation.

9.5 Management of Storage Areas

The Wellsite Supervisor is responsible for ensuring that storage areas are kept clean, tidy, monitored regularly for signs of odour, leaks or damage to containers or collection of surface water. Containers identified as leaking or damaged, are to be segregated and provisions implemented for the containment, immediate use or offsite disposal by an Environment Agency licensed waste carrier to an Environment Agency licensed waste facility.

9.6 Waste Storage

Waste products will be stored in a designated area onsite prior to disposal. The storage area will contain, where possible, enclosed skips for the containment, storage and collection of waste products. To ensure that potential reactions between waste products and degradation of waste is reduced or eliminated, waste will be segregated and

stored in specific storage areas or waste receptacles prior to offsite disposal by an Environment Agency licensed waste carrier to an Environment Agency licensed waste facility.

It is not envisaged that waste will be held onsite for a period of time that will allow for waste degradation and production of odorous emissions. To ensure that onsite waste storage procedures are followed the Wellsite Supervisor is to undertake regular inspections of waste storage areas and receptacles.

10 Additional Control Measures

10.1 Engineering Controls

Engineering controls eliminate or reduce exposure to odours through the use or substitution of engineered machinery or equipment. The Operator will require, where possible, service providers to provide the Best Available Techniques (BAT) during operations.

BAT machinery and equipment will assist in eliminating potential odours at source using oil and gas industry engineering control measures which include:

- Incorporating odour abatement engineering controls into onsite processes including:
    - Installation of scrubbers at vent points within the well testing spread. Scrubbers may include those designed to mitigate against Hydrogen Sulphide (H_2S), hydrocarbons and/or Volatile Organic Compounds (VOCs); and
    - Installation of scrubbers at vent points within the waste storage process. Scrubbers may include those designed to mitigate against hydrocarbons and/or VOCs;
- Designing the process to minimise potential odours, i.e.:
    - Well process equipment to be an enclosed process with minimal release points (tank breather line(s) and combustion unit); and
    - Use of Environment Agency approved units for the incineration of potentially odorous waste gases.
- Use of non-odorous products where possible.

10.2 Equipment Design

Equipment provided by service providers is to meet current oil and gas industry BAT. Equipment identified as not meeting the required oil and gas industry BAT will be notified to the service provider and they will be asked to source alternative and available equipment to ensure compliance with current oil and gas industry BAT.

10.3 Maintenance and Servicing Procedures

To ensure that maintenance and servicing of equipment is kept to a minimum, the Operator will request that general maintenance and servicing of equipment is conducted by service providers prior to mobilisation to site. This will ensure that the risk of potential odorous emissions during maintenance and servicing is reduced to a minimum and the potential for equipment failure is reduced.

For clarity, maintenance and servicing may include, but may not be limited to, the following equipment:

- Generators (all types);
- Separator;
- Combustion units;
- Choke manifold;
- Fluid pump;
- Storage tanks;
- Heater; and
- Pipework.

If there is a requirement for maintenance or servicing of equipment on site, control measures to eliminate or reduce potential odorous emissions detailed within this Odour Management Plan are to be followed

These include:

- Containment and removal of odorous waste materials where practicable. Where practicable, waste materials from maintenance and servicing operations shall be contained in air tight waste receptacles to ensure that odorous vapours cannot be released during storage, handling and transportation. Waste materials from maintenance and servicing operations may include:
    - Waste oils;
    - Grease;
    - Containers;
    - Filters; and
    - Absorbents.
- Controlling evaporation of odorous materials / odorous chemicals to air, e.g.;
    - Maintenance and servicing to be undertaken under cover and out of direct sunlight (where practicable);
    - Where odour emitting liquids are exposed to atmosphere, tarpaulin / sheeting shall be erected overhead to minimise evaporation rates; and
    - Pipes and equipment to be purged prior to breaking containment.
- Containment of odorous emissions; and
- Odour mitigation techniques.

10.4 Promotion of Good Housekeeping

The Operator promotes good housekeeping at all times ensuring that waste products are identified and the necessary actions for the storage and containment of waste products are implemented as soon as reasonably practicable.

Housekeeping is part of the Wellsite induction process and housekeeping audits are to be undertaken on a regular basis by the Wellsite Supervisor and the Operator's Senior Management.

The Operator uses an incident reporting system whereby incident reports are completed by site personnel for reporting negative observations throughout operations and are recorded and actioned as soon as reasonably practicable by the Wellsite Supervisor.

11 ODOUR RELEASES

11.1 Identification of Potential Odour Release Points

Potential odour release points have been identified within the Odour Risk Assessment and include, but not limited to, the following potential odour release points:

- Well Head;
- Pressure Control Equipment (PCE);
- Well Testing / Production Equipment;
- Combustion Units;
- Onsite Power Generation Equipment;
- Storage Tanks / Storage Tank Vent Stacks;
- Storage Areas / Process Areas;
- Spillages;
- Waste Skips and Waste Receptacles; and
- Site Sewage Tank.

Control measures for releases of potential odours are detailed within the Odour Risk Assessment provided in support the environmental permit application.

11.2 Controlling Evaporation of Odorous Products

In the event that odorous products cannot be substituted for non-odorous products, control measures will be implemented to reduce the rate of evaporation. The main method for reducing the rate of evaporation is by using enclosed tanks.

The benefit of using enclosed tanks includes:

- Preventing odorous substance from coming into contact with direct sunlight thereby reducing evaporation rates and the release of dissolved odorous chemicals;
- Reduce air flow over the surface of odour-releasing materials thus reducing evaporation rate; and
- Reduce surface area of odorous materials thus reducing evaporation rate.

The advantage of using enclosed tanks is that a lot of the environmental factors which may contribute to odour release are ‘designed out’.

11.3 Containment of Odorous Emissions

Potential odours may be contained within pipework and enclosed tanks of equipment used within operations. Where practicable, pipework and enclosed tanks will remain sealed until cessation of operations thus reducing the likelihood of potential odorous emissions.

In the event that containment is to be broken on pipework or enclosed tanks, where possible, purging of the system is to be undertaken prior to breaking containment. Liquids used for purging are to be transferred to sealed tanks where odour treatment or offsite disposal by an Environment Agency licensed waste carrier to an Environment Agency licensed waste facility for odour treatment can be undertaken.

Tanks and pipework containing potential odorous emissions are to be checked on a regular basis by the service provider and the Wellsite Supervisor for leaks and/or damage to the containment system. All checks are to be recorded and records of checks are to be made available for inspection.

11.4 Odour Abatement Techniques

In the event odour is still apparent following the implementation of design and engineering controls i.e. enclosed storage tanks, then Odour abatement techniques will be employed to remove any residual odours.

The only known odour abatement technique is the removal of the odorous product. Therefore, odorous materials will be removed when safe and practical to do so. Other abatement techniques which may be used are;

- Adsorption using activated carbon;
- Absorption (scrubbing); and
- Odour treatment chemicals.

These methods can only be used once the method has been proved safe for the material being treated. Due to the nature of oil and gas operations it is not always possible to predict the odour causing substance prior to operations commencing.

11.5 Dispersion

During well testing operations, a shrouded ground flare will be used to safely incinerate natural gas. The shrouded ground flare will ensure that all flammable gas mixtures will be incinerated, which in turn will minimise any potential odorous emissions from the Wellsite.

Local meteorological monitoring will be undertaken at the Wellsite during operations to provide information on weather conditions, including wind direction and wind strength. This will assist in providing local modelling for any air dispersion from the Wellsite and provide an early indication of any odour control measures that may be required.

For clarity, local meteorological monitoring undertaken onsite will consist of analysing local weather reports from the Met Office, monitoring wind direction, wind speed and weather conditions. Information from the local meteorological monitoring will provide the Wellsite Supervisor with an estimated direction and range of any dispersion.

Due to the nature of the operations, specifically the need to flow the well over a prolonged period of time, it will not be possible to restrict the well testing phase to high wind, high dispersion scenarios. The control measures adopted by the Operator will ensure that any potential odour as a result of flowing the well, either during clean up or flow testing (with/without N_2 and/or CO_2) will be reduced to as low as reasonably practicable.

The mitigation measures include separating out the gas from liquids by way of a three phase separator and a knock out pot, ensuring that a cleaner burn is achieved within the shrouded ground flare. In addition, a scrubber(s) will be in place at the Wellsite to remove any potential H_2S within the natural gas streams.

The height of the shrouded ground flare is anticipated to be in excess of 6m (PW Flare 42’ (12.80m) which will contribute to better dispersion overall. The shrouded ground flare has been selected on its ability to effectively incinerate with high levels of efficiency which, in the event that odorous materials are present within the gas following treatment (i.e. separation and scrubbers), they will adequately be incinerated.

The primary use of the shrouded ground flare is for the safe disposal of natural gas and although odour dispersion will be managed where possible, there will be certain events when odour emission will not be controlled such as, but not limited to;

- A well control event or emergency shut down;
- Well clean up; and
- Unpredictable multi-phase flow or solids production.

12 IMPACTS

12.1 Local Receptors

Wellsite selection, in particular the separation distance between the Wellsite and sensitive receptors, is an important factor when considering oil and gas operations and their potential impact upon the surrounding environment. It is envisaged that the local community will not be familiar with some of the potential odours from the operations conducted at the Wellsite and therefore any odours emitted from the Wellsite will be classed as offensive.

Receptors are classed in to the following categories:

- Low – Footpath or road;
- Medium – Industrial or commercial workplaces; and
- High (sensitive) – Housing, pubs, hotels etc.

The Wellsite lies to the south east of the village of Burniston and is accessed from the A165 Coastal Road. The Wellsite falls within Burniston Parish Council and covers an area of approximately 1.2 ha.

The Wellsite lies within a rural area. However, there are a number of industrial units served by the existing access track to the south. An animal feed mill, served by a separate access, lies 200m to the southwest of the Wellsite.

The Wellsite is partially screened by existing woodland on its southern boundary and intermittent (gappy) hedgerows to the wider field boundaries to the north sides.

The Wellsite lies at approximately 57m AOD on the northern edge of the Wellsite and falls in a southerly direction to around 49m AOD in the southern part of the Wellsite.

The closest residential receptors are:

- Wayside Farm – 280m West; and
- Burniston – 310m West.

Other residential properties nearest to the 'Wellsite' are provided within Table 3.

Residential Receptor	Distance from Site	Direction from Site
Ians Field Farm	0.77 Km	South
Cliff Top House	0.94 Km	Northeast
West Field Farm	1.02 Km	Northwest
Swarthlands Farm	1.06 Km	Southwest
Cloughton Fields Cottage	1.14 Km	North
Scalby Lodge	1.26 Km	South
Fields Farm	1.30 Km	North
Cloughton	1.54 Km	Northwest
Scarborough	1.67 Km	South
Highlands Farm	1.97 Km	Northwest

Table 3: Residential Receptors Located within 1 Km of the 'Wellsite'

Details of receptors identified within 2 Km and 10 Km of the Wellsite are provided within the Environmental Risk Assessment (07 – Environmental Risk Assessment) provided in support the environmental permit application.

12.2 Designated Sites

A search of the Multi-Agency Geographic Information for the Countryside (MAGIC) [Ref.7] website was undertaken to identify statutory receptors within 10 Km and 2 Km of the 'Wellsite'. The search resulted in five (5) designated receptors, which are provided within Table 4.

Receptors	Search Radius	Name	Distance from Site	Direction from Site	Grid Reference (Edge)
Special Areas of Conservation (SAC)	**10 Km**	Beast Cliff - Whitby (Robin Hoods Bay)	6.04 Km	North	TA 00520 98710
		North York Moors	7.58 Km	Northwest	TA 97485 98904
			9.03 Km	Northwest	TA 94765 98147
Special Protection Areas (SPA)	**10 Km**	North York Moors	7.58 Km	Northwest	TA 97485 98904
			9.03 Km	Northwest	TA 94765 98147
		Flamborough and Filey Coast	9.36 Km	Southeast	TA 09017 86446
SPA (Marine)	**10 Km**	Flamborough and Filey Coast	9.36 Km	Southeast	TA 09017 86446
RAMSAR	**10 Km**	No Receptors Found	-	-	-
SAC (Marine)	**10 Km**	No Receptors Found	-	-	-
Marine Conservation Zones	**10 Km**	No Receptors Found	-	-	-
World Heritage Sites	**10 Km**	No Receptors Found	-	-	-
Areas of Outstanding Natural Beauty (AONB)	**10 Km**	No Receptors Found	-	-	-
Sites of Special Scientific Interest (SSSI)	**2 Km**	Iron Scar and Hundale Point to Scalby Ness	0.64 Km	East	TA 02711 93128
			1.11 Km	Southeast	TA 02866 91953
			1.39 Km	Northeast	TA 02766 94133
National Parks	**2 Km**	North York Moors	0.81 Km	North	TA 02075 93717
			0.82 Km	Northwest	TA 01480 93448
Scheduled Ancient Monuments	**2 Km**	Post-medieval dovecote 40m south of Cloughton Hall	1.77 Km	Northwest	TA 00881 94190
Local Nature Reserves (LNR)	**2 Km**	No Receptors Found	-	-	-
National Nature Reserves (NNR)	**2 Km**	No Receptors Found	-	-	-
National Forest	**2 Km**	No Receptors Found	-	-	-

Receptors	Search Radius	Name	Distance from Site	Direction from Site	Grid Reference (Edge)
RSPB Reserves	**2 Km**	No Receptors Found	-	-	-
Registered Battlefields	**2 Km**	No Receptors Found	-	-	-
Registered Parks and Gardens	**2 Km**	No Receptors Found	-	-	-
Wood Pastures and Parkland BAP Priority Habitat	**2 Km**	No Receptors Found	-	-	-

Table 4: MAGIC Desktop Study Results – Designated Sites

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13 ODOUR MONITORING

Odour monitoring will be carried out by site personnel throughout operations as detailed in Section 13.2 and Section 13.3 of this Odour Management Plan.

To ensure the effectiveness of odour control measures, odour monitoring shall be undertaken immediately following the assessment and implementation of odour control measures. Thereafter, periodic odour monitoring shall be undertaken to ensure the continued effectiveness of such control measures.

13.1 Monitoring Techniques

All odour monitoring techniques will be carried out in accordance with the requirements of the Environment Agency guidance for H4 Odour Management; *How to comply with your environmental permit* and may include the following techniques:

- Emissions Monitoring;
- Grab Sampling of Source Emissions;
- Sniff Testing;
- Complaints Investigation; and
- Odour Diaries.

13.2 Steady State Odour Monitoring

Steady state odour monitoring will be conducted throughout operations to provide real time odour monitoring across the entire Wellsite. This shall be undertaken via means of sniff testing.

All personnel on the Wellsite shall receive training on the importance of conducting steady state odour monitoring and reporting any incidents of odour during operations. A record of training shall be maintained and held by the Operator.

All odours reported shall be recorded and any strong odours shall be identified as detailed within section 13.4 of this Odour Management Plan.

13.3 Release Point Monitoring

Potential odour release points shall be identified on the Odour Risk Assessment and shall be monitored, by means of sniff testing, for potential odour emissions. Wellsite personnel involved in release point monitoring shall receive 'release point monitoring' training from the Operator and a record of training will be held.

If an odour is detected which is attributable to the operations, the release point shall be identified and odour control measures implemented.

To ensure that the odour control measures are sufficient, specific odour monitoring at the release point identified will be undertaken regularly throughout the operation.

13.4 Reporting and Recording of Odour Emissions

All odours noted on site shall be reported to the Wellsite Supervisor and recorded.

Strong odours that are attributable to site operations or any unidentifiable odours shall be recorded using the Operator's Odour Report Form.

Due to the location of the Wellsite, there is the potential for odours not associated with the oil and gas industry, i.e. from local farming practices or other industrial processes, to be identified within the Wellsite or localised area. To ensure that odours not associated with standard operations are recorded and identified, persons are still to report odours not associated with standard operations to the Wellsite Supervisor who will record it appropriately.

If an odour is reported and the source of the odour is unidentified, an investigation of the odour is to be undertaken as detailed in Section 14 of this Odour Management Plan.

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14 ODOUR INVESTIGATION

14.1 Odour Identification

As soon as reasonably practicable, once an unknown odour from the operations has been reported, an investigation will be conducted by the Wellsite Supervisor to determine the odour release point, odour source and the substance creating the odour.

The Wellsite Supervisor with assistance from suitably qualified personnel is to ascertain the odour release point and the potential substance causing the odour. If the substance cannot be identified, a sample of the odour will be taken either by means of point source sampling or grab sampling and sent for analysis at an accredited laboratory.

14.2 Point Source Sampling

Point source sampling will be undertaken when the substance causing the odour cannot be determined. Point source sampling will be undertaken by a competent and suitable qualified person who may be an independent specialist or the operator of the equipment.

Point source samples will be sent for analysis at an accredited laboratory to ascertain the compound causing the odour and will include analysis of the following parameters detailed within Table 5.

Parameters	
1,3 Butadiene	m-p Xylene
Benzene	Methylcyclohexane
Carbon Disulphide	Methylcyclopentane
Carbonyl Sulphide	Sulphur Dioxide
Diethyl Sulphide	Toluene
Ethyl Benzene	Volatile Suite including C1 - C8
Hydrogen Sulphide	

Table 5: Point Source Sampling Parameters

If a direct sample cannot be attained, grab sampling will be conducted in the immediate vicinity of the odour by a competent person.

All samples will be transported to an accredited laboratory for analysis under controlled conditions.

Results of the point source sampling will be reviewed by the Operator to determine the source of the odour. Results of the point source sampling will be made available to the Environment Agency for review.

Odour sampling and analysis methodology is detailed within Odour Sampling and Analysis (14B – Odour Sampling and Analysis) provided in support the environmental permit application.

14.3 Recording of Odour Investigations

Each odour investigation shall be recorded on the Operator's Odour Report Form and communicated to the Operator's Management Team. The Operator's Odour Report Form is to include the following information:

- Date, time and location of odour.
- Description of the Odour.
- Wind Strength and Direction.
- Activities being carried out.

- Temperature.
- Weather Conditions.
- Intensity of the odour.
- Odour Release Point.
- Constant or Intermittent Odour.
- Receptor Sensitivity.
- Source of the Odour (if evident).
- Odorous Substance.
- Details of emission points sampled.
- Sampling Method.
- Preservation and Transporting Procedures.
- Laboratory details undertaking analysis.
- Control Measure Implemented.
- Sketch of where the odour was reported.

14.4 Odour Tracking

All odours due to activities shall be recorded on the Operator's Odour Report Form and, where actionable, the Operator's Odour Action Log. The Operator shall record all odour complaints on the Operator's Action Log to ensure that the complaint is tracked to conclusion and closed out.

The Operator's Action Log shall include all reports and investigations of the odour. The Operator's Action Log may help identify, if any, potential sources of odour, prevent potential reoccurrences of odour and assist in investigation of odour complaints.

15 OVERVIEW OF ODOUR MANAGEMENT

15.1 Training of Personnel

All personnel involved in odour monitoring and odour management procedures will receive training prior to commencement of their responsibilities. Training will be undertaken by an independent air quality consultant or Wellsite Supervisor and a record of training will be recorded by the Operator.

15.2 Engaging Neighbours

The Operator will communicate details of their business activities to the local community via Burniston parish council. The Operator is committed to engaging local neighbours and will investigate all odour complaints reported in accordance with the Operator's HSE Management System.

15.3 Odour Complaints

In the event that a complaint is received by the Operator from persons not associated with the appraisal operations, the complaint shall be investigated. Complaints relating to the environment will be reported to the Environment Agency.

15.3.1 Recording Odour Complaints

Odour complaints shall be recorded on the Operator's Odour Complaint Form and an entry made in the Operator's Action Log to monitor the frequency at which complaints are received.

The Operator's Action Log shall include a subjective description of each complaint, allowing the Operator to calculate the number of complaints received. The Wellsite Supervisor is to record and investigate all odour complaints and communicate their findings and recommendations to Senior Management.

15.3.2 Odour Diaries

In the event of a complaint being registered, the Operator may ask residents of local sensitive receptors to maintain an odour diary throughout the appraisal operations. All information should be recorded on the Operator's Odour Diary Form. The Operator shall keep a copy of all Odour Diary Forms.

15.4 Audit Requirements

Senior management will conduct periodic audits of compliance with the Odour Management Plan and communicate environmental performance, significant findings and non-conformances.

The Wellsite Supervisor will ensure sufficient priority is placed on undertaking audits and ensure that performance and findings from audits, inspections and non-conformances is communicated to site personnel and contractors.

15.5 Arrangements for Reviewing and Revising the Odour Management Plan

The Operator will periodically review the Odour Management Plan or when significant changes to operations or site equipment have occurred and amend where necessary in accordance with the Operator's Document Control and Data Records Standard and procedures.

15.6 Incidents and Emergencies

Unplanned incidents and emergencies may cause odour pollution. In the event of an unplanned incident or emergency there is the capacity to shut in the well and equipment to prevent the further release of reservoir and wellbore fluids from the well. Wellsite personnel are to follow emergency procedures and the Operator's emergency response procedures. All emergency actions must be carried out to make the wellsite and personnel safe in the first instance before odour assessments can be conducted.

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REFERENCES

1. The Environmental Permitting (England and Wales) Regulations 2016
   Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made

2. Environment Agency Guidance for H4 Odour Management: *how to comply with your environmental permit*
   Available at: https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management

3. Environment Agency (Environmental Permitting and Abstraction Licensing) (England) Charging Scheme
   Available at: https://www.gov.uk/government/publications/environmental-permits-and-abstraction-licences-tables-of-charges

4. Council Directive 2006/21/EC on the management of waste from extractive industries and amending Directive 2004/35/EC
   Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02006L0021-20090807&from=EN

5. Council Directive 2010/75/EU on the industrial emissions (integrated pollution prevention and control)
   Available at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0075&from=EN

6. European Union (Withdrawal) Act 2018
   Available at: https://www.legislation.gov.uk/ukpga/2018/16/contents/enacted

7. Multi-Agency Geographic Information for the Countryside
   Available at: https://magic.defra.gov.uk/MagicMap.aspx