UKOG PLC

Title: Environmental Risk Assessment

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REVISION DESCRIPTION SHEET			
This sheet must be completed in detail, at each revision, once this document has been issued at revision 0. Details to include revision number, a description of the revision indicating paragraphs and pages that have been revised, together with the date and approved signature.			
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1. INTRODUCTION

UK Oil & Gas PLC (herein referred to as UKOG) is a public limited company that was formed to manage the exploration activities within Petroleum Exploration and Development Licence 331 (PEDL 331). UKOG has operatorship of PEDL 331 within which the proposed Arreton Well Site is located.

UKOG have prepared an application to the Environment Agency seeking permission to undertake a number of permitted activities in accordance with the Environmental Permitting (England and Wales) Regulations 2016 (EPR2016).

2. SCOPE

This Environmental Risk Assessment is applicable to the proposed Arreton Well Site and all operations conducted therein. It has been produced to present and outline the assessment of the environmental risks for the site during the proposed exploratory operations.

It is applicable to UKOG, its contractor and subcontractors and can be used in support of an application to the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016 (EPR2016), where there is a requirement to provide an Environmental Risk Assessment. This Environmental Risk Assessment has been carried out in accordance with the Environment Agency guidance[1].

3. DEFINITIONS

ID:	Identification number the hazard has been given to allow for easy referencing.
Source:	A source of pollutants from the activity taking place such as flaring. (Source can also be referred to as 'hazard').
Receptor:	Although the likelihood of pollution is low it may have an adverse effect on surrounding residents, wildlife and habitats; these are known as the pollutants receptors.
Pathway:	The pathway the pollutant is taking such as air or unsaturated zones.
Risk Management:	Mitigation measures that will be put in place to control the risks so far as reasonably practicable.
Probability of Exposure:	The chance of the hazard occurring taking into account mitigation measures.
Consequence:	A result of an event or action that has occurred.
Overall Risk:	A hazard that has been assessed and has been given a risk rating level post mitigation measures i.e. not significant, low, medium, high very high etc.
Not Significant:	The severity of risk together with the likelihood of the risk is not expected to cause harm to the environment.
Low:	The severity of risk together with the likelihood of the risk has low potential for causing harm to the environment.
Medium:	The severity of risk together with the likelihood of the risk has a moderate potential for causing harm to the environment.
High:	The severity of risk together with the likelihood of the risk has a high potential for causing harm to the environment.
PEDL:	Petroleum Exploration and Development Licence.

[1] https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit#risks-from-your-site

4. METHODOLOGY

The structure of the Environmental Risk Assessment follows the Environment Agency guidance using a source pathway receptor model and includes:

- Identifying the risk from the site;
- Assessing risks and checking they are acceptable;
- Justifying appropriate measures to control the risk (if needed); and
- Presenting the risk assessment.

The Environmental Risk Assessment has included the following items, which have been reviewed for applicability within the proposed operations.

- Accidents & Incidents;
- Air Emissions;
- Dust;
- Fugitive Emissions;
- Global Warming Potential;
- Light;
- Noise;
- Odour;
- Releases to Water; and
- Waste.

This Environmental Risk Assessment is based on a qualitative assessment and details the activities and events that may lead to environmental impact on one or more receptors.

4.1 Scoring Criteria

In order to establish a risk rating for each **Source-Pathway-Receptor** (S-P-R) linkage both the Likelihood (**Probability of Exposure**) and Consequence have been issued a score. The score is used in conjunction with Table 4.3 to provide an overall risk rating of the activity. All scores and risk ratings are provided on the basis that the mitigation measure are in place.

Likelihood	Descriptor
Very Low	Rarely encountered, never reported or highly unlikely.
Low	Infrequent Occurrences.
Medium	Can be expected to occur several times per year.
High	Repeated Occurrences.

Table 4.1: Scoring System - Likelihood

Consequence	Descriptor
Very Low	Slight environmental effect that does not exceed a regulatory standard.
Low	Minor environmental effect which may breach a regulatory standard but is localised to the point of release with no significant impact on the environment or human health.
Medium	Moderate, localised effect on people and the environment in the vicinity of the incident.
High	A major environmental incident resulting in significant damage to the environment and harm to human health.

Table 4.2: Scoring System - Consequence

The risk matrix presented in Table 4.3 below derives a risk rating for each S-P-R linkage identified within this Environmental Risk Assessment.

Risk Rating		Consequence			
		Very Low	Low	Medium	High
Likelihood	Very Low	Not Significant	Not Significant	Low	Low
	Low	Not Significant	Low	Medium	Medium
	Medium	Low	Medium	Medium	High
	High	Low	Medium	High	High

Table 4.3: Risk Matrix

Environmental risks are assigned a Not Significant, Low, Medium or High risk rating and coded using a colour coded system. A description of each risk rating is presented in Table 4.4 below.

Risk Rating	Acceptable?	Descriptor
Not Significant	Acceptable	Near-certain that an incident will not occur. If it did occur the consequences would not be significant.
Low	Acceptable	Unlikely an incident will occur or give rise to anything more than a minor consequence on the immediate area.
Medium	Tolerable	The activity can only take place provided that any impacts remain localised and risk remediation is readily available.
High	Unacceptable	The risk must be further reduced before the activity can commence.

Table 4.4: Risk Rating Definitions

Receptors	Search Radius	Name	Distance from Site	Direction from Site	Grid Reference (Edge)
RAMSAR	**10km**	Solent & Southampton Water	4.14km	North West	SZ 50160 89926
Special Areas of Conservation (SAC)	**10km**	Briddlesford Copses	2.89km	North East	SZ 54186 88703
		Solent Maritime	4.14km	North West	SZ 50160 89926
		South Wight Maritime	7.42km	South East	SZ 59613 83710
		Isle of Wight Downs	8.43km	South East	SZ 55608 78460
Special Protection Areas (SPA)	**10km**	Solent & Southampton Water	4.14km	North West	SZ 50160 89926
Marine Protection Areas (MPA)	**10km**	Solent and Dorset Coast	3.20km	North West	SZ 50225 88798
		Solent and Southampton Water	4.14km	North West	SZ 50160 89926
Sites of Special Scientific Interest (SSSI)	**2km**	Arreton Down	1.08km	North East	SZ 53242 87161
Scheduled Ancient Monuments (SAM)	**2km**	Bowl Barrow known as Michael Morey's Hump, and a Highway Commission Barrier on Gallows Hill	1.49km	North East	SZ 53554 87423
		Bowl Barrow on Arreton Down	1.66km	North East	SZ 53927 87221
		Downend Romano-British Villa	1.84km	North East	SZ 53703 87760
World Heritage Sites (WHS)	**2km**	None Identified			
National Nature Reserves (NNR)	**2km**	None Identified			
Local Nature Reserves (LNR)	**2km**	None Identified			
Surface Water Features	**2km**	Refer to Hydrogeological Risk Assessment and Flood Risk Assessment			
Sensitive Receptors: Households / Businesses	**2km**	Power Station	0.25km	East	SZ 52773 86407
		New Barn	0.40km	South West	SZ 52055 86087
		Great East Standen Manor	0.55km	North	SZ 52480 86989
		Pyle Cottage	0.57km	South West	SZ 51847 86084
		Merstone including Padan Aran Cottage	0.75km	South	SZ 52715 85584
		Conveyors	0.77km	West	SZ 51570 86344
		Roslyn Cottage	0.77km	North	SZ 52534 87206
		The Old Farm house	0.84km	North West	SZ 52005 87182
		Arreton	0.86km	East	SZ 53304 86704
		JD Pipes	0.88km	South East	SZ 53116 85702
		Longdown	0.96km	South West	SZ 51574 85773
		Manor Cottage	0.97km	South West	SZ 51826 85548
		Arreton House	0.97km	North East	SZ 53141 87102
		Locks Cottage	1.06km	North West	SZ 51530 87043
		Perraton Farm	1.13km	South East	SZ 53274 85512
		Little East Standen Farm Cottage	1.15km	North	SZ 52766 87530
		Little Birchmore	1.25km	South West	SZ 51741 85262
		Little East Standen Farm	1.29km	North	SZ 52736 87693
		Garrets Farm	1.38km	North West	SZ 51301 87278
		Black Water	1.41km	West	SZ 50952 86169
		Green Acres Farm	1.41km	North	SZ 52115 87829
		Downend and Adventure Park	1.43km	North East	SZ 53309 87550
		Great East Standen Farm	1.45km	North West	SZ 51767 87746
		Newport Golf Club - Club House	1.56km	North West	SZ 51086 87274
		Birchmore Farm	1.57km	South West	SZ 51063 85463
		Burnt House Farm	1.59km	North West	SZ 51736 87889
		Fulford	1.66km	South East	SZ 53974 85565
		Little Owl Cottage	1.71km	South East	SZ 53917 85384
		Redway Dwellings	1.72km	South East	SZ 53496 84880
		Stickworth Lodge	1.78km	South East	SZ 53947 85276
		Standen House	1.79km	North West	SZ 50723 87106
		Durton Farm	1.85km	North	SZ 52125 88272
		Highwood Cottage	1.86km	North	SZ 52691 88286
		Suda Farm	1.88km	North	SZ 52193 88311
		Mornhill	1.89km	North West	SZ 51828 88241
		Station House	1.96km	South East	SZ 54216 85380
		West Standen Farm	1.96km	North West	SZ 50702 87415

Table 5.1: Receptor Details

Assessment of Odour Risk

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Breaking containment on tanks and pipework carrying produced fluids.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Breaking containment of tanks and pipework systems shall be kept to a minimum. Tanks and pipework shall be cleaned / purged where possible prior to breaking containment. Records will be kept of complaints and actions taken to resolve complaints where required. Odour (if present) is likely to be in small concentrations that will disperse before reaching receptors. An Odour Management Plan will be in place, distributed and adhered to.	**Very Low** No exposure expected or adequately dispersed prior to reaching receptors.	**Very Low** Weak unfamiliar odour at site boundary.	**Not Significant** If Managed Correctly
002	Produced fluids on the external surface of drilling pipe / equipment.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Drilling pipework / equipment to be cleaned / purged where possible prior to pulling out of hole. Records will be kept of complaints and actions taken to resolve complaints where required. Odour (if present) is likely to be in small concentrations that will disperse before reaching receptors. An Odour Management Plan will be in place, distributed and adhered to.	**Very Low** No exposure expected or adequately dispersed prior to reaching receptors.	**Very Low** Weak unfamiliar odour at site boundary.	**Not Significant** If Managed Correctly
003	Transporting fluid from the borehole to surface.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Breaking containment of tanks and pipework systems is to be kept to a minimum. Tanks and pipework to be tested for defects prior to being delivered and inspected once at site. Records will be kept of complaints and actions taken to resolve complaints where required. Odour (if present) is likely to be in small concentrations that will disperse before reaching receptors. An Odour Management Plan will be in place, distributed and adhered to.	**Very Low** No exposure expected or adequately dispersed prior to reaching receptors.	**Very Low** Weak unfamiliar odour at site boundary.	**Not Significant** If Managed Correctly
004	Incinerations of natural gas during testing operations.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Flare units to be agreed by Environment Agency to ensure compliance prior to use. Flare units to be considered Best Available Technique (BAT) or BAT Equivalent. Flare units to have a minimum combustion efficiency of 98%. Records will be kept of complaints and actions taken to resolve complaints where required. Odour (if present) is likely to be in small concentrations that will disperse before reaching receptors. An Odour Management Plan will be in place, distributed and adhered to.	**Low** Little exposure expected or adequately dispersed prior to reaching receptors.	**Low** Weak unfamiliar odour at nearest receptor.	**Low** If Managed Correctly
005	Storage / use / transfer and decanting of odorous products during operations.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Odorous products to be substituted for odourless products where reasonably practicable. Quantities of odorous chemicals / oils are to be kept to a minimum where possible. Damaged / leaking containers are to be segregated and used as a priority where possible. Chemicals / oils are to be segregated / stored correctly and sealed / closed when not in use. Spillage pads / containers are to be used to ensure any spillages are contained. During transfer / decanting of odorous chemicals / oils the following procedures are to be undertaken: • Containers shall be sealed when not in use and will to be checked for damage and leaks; • Spillage pads / containers are to be used to ensure any spillages are contained effectively; • Avoid direct sunlight where possible; and • Reduce evaporation rate by eliminating air flow and surface area. Records will be kept of complaints and actions taken to resolve complaints where required. Odour (if present) is likely to be in small concentrations that will disperse before reaching receptors. An Odour Management Plan will be in place, distributed and adhered to.	**Very Low** Odorous emissions may be released during transfer / decanting of substances.	**Very Low** Weak unfamiliar odour at site boundary.	**Not Significant** If Managed Correctly
006	Release of odour from the storage of raw materials.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Use of raw materials that are less likely to cause odour problems. Raw materials to be ordered to requirement to ensure stored quantities are kept to a minimum. Quantity of materials to be planned to ensure that orders of biodegradable materials will be limited and excess quantities kept to a minimum. Materials to be managed, stored and handled correctly by competent personnel. Regular inspections of materials / storage area to identify sources of potential odorous emissions. Records will be kept of complaints and actions taken to resolve complaints where required. Odour (if present) is likely to be in small concentrations that will disperse before reaching receptors. An Odour Management Plan will be in place, distributed and adhered to.	**Very Low** No exposure expected or adequately dispersed prior to reaching receptors.	**Very Low** Weak unfamiliar odour at site boundary.	**Not Significant** If Managed Correctly

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
007	Release of odour from site waste skips and waste storage containers.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Skips to be self-contained / enclosed to prevent emissions. Skips to be clearly marked to ensure waste streams are segregated and avoid cross contamination. Skips to be monitored and emptied as required. Records will be kept of complaints and actions taken to resolve complaints where required. Odour (if present) is likely to be in small concentrations that will disperse before reaching receptors. An Odour Management Plan will be in place, distributed and adhered to.	**Very Low** No exposure expected or adequately dispersed prior to reaching receptors.	**Very Low** Weak unfamiliar odour at site boundary.	**Not Significant** If Managed Correctly

Assessment of Noise and Vibration

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Vehicles including: • Engines; • Reversing Alarms • Unloading / Loading	Atmosphere and Ground Vibrations	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Noise limits set by the planning authority shall not be breached. Transport restrictions set by the planning authority shall not be breached. Noise monitoring to be conducted if required. Vehicle loads and transportation to be planned to reduce quantity of deliveries / collections. Directional / white noise reversing alarms are to be fitted to site vehicles if required. Loading / unloading operations will be planned where possible during day light hours. Trained operators to load / unload vehicles using MHE plant equipment. Equipment to be switched off when not in use. Records will be kept of complaints and actions taken to resolve complaints where required.	**Low** Noise and vibration may occasionally reach local inhabitants.	**Very Low** Complaints of low level noise at nearest receptor	**Not Significant** If Managed Correctly
002	Noise from the proposed operations including noise levels from: • Drilling rig; • Site plant equipment; • Generators; and • Movement of equipment around site. Vibration from drilling operations and site vehicles.	Atmosphere and ground vibrations.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Noise limits set by the planning authority shall not be breached. Directional / white noise reversing alarms are to be fitted to site vehicles if required. Vehicles / equipment are to be serviced and maintained to manufacturer's / industry standards. Loading / unloading operations will be planned where possible during day light hours. Trained operators to load / unload vehicles using MHE plant equipment. Equipment to be switched off when not in use. Records will be kept of complaints and actions taken to resolve complaints where required.	**Low** Noise and vibration may occasionally reach local inhabitants.	**Very Low** Complaints of low level noise at nearest receptor	**Not Significant** If Managed Correctly
003	Flaring Operations	Atmosphere	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Regular maintenance and inspections are to be conducted as directed by written procedures. Flare units are shrouded mitigating noise levels at source. Flare units to be monitored and controlled at all times. Gas rates to the flare can be reduced as required to reduce noise levels should they exceed levels set by the planning authority. Records will be kept of complaints and actions taken to resolve complaints where required.	**Low** During flaring operations noise will be produced from the flaring of gases.	**Low** Complaints of consistent noise at nearest receptor.	**Low** If Managed Correctly

Assessment of Groundwater Risks

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Produced Hydrocarbons from the formation.	Loss of well integrity leading to leakage.	Groundwater bearing formations not including the target formation.	The borehole will be constructed to industry standards / best available techniques and reviewed by an independent well examiner which Includes the segregation of near surface groundwater by multiple casing strings and cementation. Adequate mud weight / suspension fluid weight, well control equipment and procedures in place. Competent Site Supervisor who holds a certified, in date, well control certificate present at site. Cementing best practices utilised. A Hydrogeological Risk Assessment has been conducted by a specialist hydrogeologist and confirmed a 'very low' risk rating.	**Very Low** Management actions and well design should prevent this happening.	**Low** Minor pollution event to deep groundwater bearing formation	**Not Significant** If Managed Correctly
002	Acid Wash	Introduced to formations via perforations.	Groundwater bearing formations not including the target formation.	The borehole will be constructed to industry standards / best available techniques and reviewed by an independent well examiner. Competent Site Supervisor who holds a certified, in date, well control certificate present at site. A Hydrogeological Risk Assessment has been conducted by a specialist hydrogeologist and confirmed a 'very low' risk rating. Acid will be introduced to targeted formations only which may be the formation at a volume considered de minimis and in a dilute solution ≤15%. Once the acid reacts with the formation it becomes a spent (neutralised) resulting in salt, water and carbon dioxide.	**Very Low** Target formation to be exposed. Unlikely to migrate out of the target formation.	**Very Low** Slight pollution occurrence to deep groundwater bearing formation	**Not Significant** If Managed Correctly
003	Spillages from the surface including hazardous materials.	Percolation to the near surface groundwater.	Near surface groundwater bearing formations.	Wellsite constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and any pollutants are captured within a containment ditch system. The liner is considered tertiary containment. The impermeable liner will be the subject of integrity tests during construction. Hazardous materials shall be stored within secondary containment i.e. bunding, double bunded tanks.	**Very Low** Management actions and well site design should prevent this happening.	**Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly

Assessment of Fugitive Emissions Risks

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	**Emissions to Air** Methane Emissions from the wellbore.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	The wellbore will be constructed to industry standards / best available techniques and reviewed by independent well examiner. Competent Site Supervisor who holds a certified, in date, well control certificate present at site. Use of competent drilling fluids / suspension fluids management personnel. Safe working procedures / toolbox talks conducted prior to operations commencing, documented and widely known by site personnel. The well will be the subject of a number of integrity tests during the installation. Gas detection units are provided at site for early detection of methane. Notification to the emergency services upon commencement of operations with the local Fire and Rescue service adopting a major accident plan. Training on environmental awareness and emergency procedures for site personnel. Emergency response plan both on and off site established / tested prior to commencement of operations and on a regular basis thereafter.	**Very Low** Management actions and well design should prevent this happening.	**Low** Minor pollution to immediate air quality.	**Not Significant** If Managed Correctly
002	**Emissions to Air** VOC's from exhaust systems.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Vehicle loads and transportation to be planned to reduce quantity of deliveries / collections. Vehicles are to be serviced and maintained to manufacturer's / industry standards. Equipment to be switched off when not in use.	**Very Low** Impact is unlikely to exceed the site boundary.	**Low** Minor pollution to immediate air quality.	**Not Significant** If Managed Correctly
003	**Emissions to Air** VOC's from tanks / pipework.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Breaking containment of tanks and pipework systems is to be kept to a minimum. Tanks and pipework to be cleaned where possible prior to breaking containment. A Vapour Recovery Plan will be implemented at the site. The plan will be subject to approval by the Environment Agency.	**Very Low** Impact is unlikely to exceed the site boundary.	**Low** Minor pollution to immediate air quality.	**Not Significant** If Managed Correctly
004	**Emissions to Air** Dust and mud generated by vehicles.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Operations to be planned / designed to minimise transport and handling operations. Vehicles are to drive on approved roads and follow site traffic management system. Avoid certain activities that may present dust if high winds occur. High winds are defined as a strong breeze >25mph. (http://www.rmets.org/resource/beaufort-scale). Activities include the dispensing of powders and 'where feasible' excessive driving'. Daily monitoring of wind / weather forecasts.	**Very Low** No exposure expected or adequately dispersed prior to reaching receptors.	**Low** Minor pollution to immediate air quality.	**Not Significant** If Managed Correctly
005	**Emissions to Air** Fume emissions from chemicals used during operations.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Chemicals to be stored correctly on site and containers sealed / closed when not in use. Competent personnel only to store / use chemicals. Adequate and suitable spillage kits to be available on site / transport vehicles. Training on environmental awareness and emergency procedures for site personnel. Regular maintenance and inspections are to be conducted as directed by written procedures.	**Low** Emissions from chemicals will be minor and infrequent.	**Low** Complaints of odours / smells in vicinity of local receptors.	**Low** If Managed Correctly
006	**Litter** Generated on site.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Provision of adequate refuse receptacles for both inside and outside working areas. Training on environmental awareness and site waste management as part of induction process. Skips to be monitored and emptied when required by authorised contractor. Site inspection process to be undertaken by appointed persons.	**Very Low** Management Action should prevent this happening.	**Very Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly
007	**Emissions to Water** Run-off from site operations.	Flow by gravity.	Surface Water Features Sensitive Receptors	Wellsite constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and any pollutants are captured within a containment ditch system. The liner is considered tertiary containment. The impermeable liner will be the subject of integrity tests during construction. Containment ditches are to be emptied by a licenced contractor using the correct EWC code. The site is not being considered for surface water discharge, accidental release is not foreseeable.	**Very Low** Management Action should prevent this happening.	**Very Low** Pollution of local surface or shallow groundwater.	**Not Significant** If Managed Correctly

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
008	**Pests** Flies from refuse accumulated on site. Rats / mice from surrounding area. Wasps accumulating around materials used during operations.	Air / Ground	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Refuse to be stored in enclosed skips / receptacles. Skips and refuse receptacles to be checked to ensure integrity. Refuse to be monitored and removed when skips/bins are full. Food waste to be stored separately in enclosed skips/bins. Sacks / containers to be monitored for leaks / spills. Identification of split sacks / damaged containers to be addressed immediately and contents repackaged / or used as a prioritised item. Training on environmental awareness for site personnel during site induction.	**Very Low** Wastes left unattended could result in problems off site.	**Low** Potential for spreading of disease and adverse health impacts on vulnerable people.	**Not Significant** If Managed Correctly

Assessment of Visible Plume Risks

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	**Emissions to Air** Plume emissions from flaring operation.	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Flare units to be agreed by Environment Agency to ensure compliance prior to use. Flare units to be considered Best Available Technique (BAT) or BAT Equivalent. Flare units to have a minimum combustion efficiency of 98%. Flare unit and associated pipework to be tested for leaks prior to operational use. Monitoring of flare combustion temperature to be undertaken during periods of flaring. Monitoring procedures established to include monitoring of the gas entering the flare. Good 3-phase separation upstream of flare to remove and prevent liquid carryover. Procedures established and communicated to operational personnel should the flow rate of gas exceed or fall below the flares flow range. An Air Quality Impact Assessment has been undertaken prior to commencement of flaring operations. Records will be kept of complaints and actions taken to resolve complaints where required.	**Very Low** No exposure expected or adequately dispersed prior to reaching receptors.	**Very Low** Nuisance – reduced / low visibility.	**Not Significant** If Managed Correctly

Assessment of Possible Sources of Accidents

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Transferring Substances: • Spillages; • Overfilling; or • Incorrect Connections	Flow by gravity; Air – Vapours carried on the wind.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Wellsite is to be constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and pollutants are captured within the containment system (Tertiary Containment). Storage Tanks shall be placed within a secondary containment bund or shall be double bunded units. Drip trays to be utilised and spillage kits shall be readily available to remediated spillages immediately. Trained persons to carry out loading / unloading operations. Emergency response plan established / tested.	**Very Low** Management Action should prevent this happening,	**Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly
002	Plant or Equipment failure.	Flow by gravity; Air – Vapours carried on the wind.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Wellsite is to be constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and pollutants are captured within the containment system (Tertiary Containment). Storage Tanks shall be placed within a secondary containment bund or shall be double bunded units. Maintenance and inspections are to be conducted as directed by supplier, manufacture or legislation. Safety critical spares readily available. Competent trained personnel only to operate plant or equipment. Emergency response plan established / tested. Drip trays to be utilised and spillage kits shall be readily available to remediated spillages immediately.	**Very Low** Management Action should prevent this happening,	**Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly
003	Poor storage arrangements of hazardous substances	Flow by gravity; Air – Vapours carried on the wind.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Wellsite is to be constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and pollutants are captured within the containment system (Tertiary Containment). Storage Tanks shall be placed within a secondary containment bund or shall be double bunded units. Maintenance and inspections are to be conducted as directed by supplier, manufacture or legislation. COSHH items to be segregated in line with current regulations and stored in dedicated areas. COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances available to the Fire & Rescue Service and held on site as part of Emergency Response Plan. Personnel to be trained in safe handling / use of hazardous items. Emergency response plan established / tested.	**Very Low** Management Action should prevent this happening,	**Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly
004	Incompatible Substances coming into contact (Unwanted Reactions)	Flow by gravity; Air – Vapours carried on the wind.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Wellsite is to be constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and pollutants are captured within the containment system (Tertiary Containment). COSHH items to be segregated in line with current regulations and stored in dedicated areas. COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances available to the Fire & Rescue Service and held on site as part of Emergency Response Plan. Trained Operatives only to carry out mixing operations. Emergency response plan established / tested.	**Very Low** Management Action should prevent this happening,	**Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly
005	Runaway Reactions	Flow by gravity; Air – Vapours carried on the wind.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Wellsite is to be constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and pollutants are captured within the containment system (Tertiary Containment). Trained Operatives only to carry out mixing operations. COSHH items to be segregated in line with current regulations. COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances available to the Fire & Rescue Service and held on site as part of Emergency Response Plan. Emergency shutdown procedures to be established and tested prior to and during operations.	**Very Low** Management Action should prevent this happening,	**Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly
006	Impact from Fire Water • In use; • Failed containment	Flow by gravity; Air – Vapours carried on the wind.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Wellsite is to be constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and pollutants are captured within the containment system (Tertiary Containment). COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances available to the Fire & Rescue Service and held on site as part of Emergency Response Plan. Site based fire risk assessment to be in place with fire awareness training / site induction for personnel. Local Fire & Rescue Service to be notified of operations with a review of the emergency response and a site visit possibly being undertaken.	**Very Low** Management Action should prevent this happening,	**Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
007	Flooding	Flow by Gravity	Surface Water Features Sensitive Receptors	The wellsite is situated wholly within Flood Zone 1 (Less than a 1 in 1,000 year (0.1%) annual chance of flooding from rivers and the sea).	**Very Low** Site Location should prevent this happening	**Medium** Potential for impact to exceed the site boundary.	**Low** If Managed Correctly
008	Fire and associated fumes.	Air – Vapours carried on the wind. Spread of fire on the Ground.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Site based fire risk assessment to be in place with fire awareness training / site induction for personnel. Hazardous materials stored appropriately. Local Fire & Rescue Service to be notified of operations with a review of the emergency response and a site visit possibly being undertaken. COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances available to the Fire & Rescue Service and held on site as part of Emergency Response Plan. Ignition sources shall be prohibited within explosive atmosphere zones unless authorised and permit to work is in place. Emergency response plan both on and off site established / tested.	**Very Low** Management Action should prevent this happening,	**Medium** Potential for impact to exceed the site boundary.	**Low** If Managed Correctly
009	Vandalism	Various – acts of vandalism may cause fires, loss of containment from containers, damage to site equipment, etc.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Wellsite is to be constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and pollutants are captured within the containment system (Tertiary Containment). Site security measures to be established and reviewed for suitability. Site personnel to be aware of possible unauthorised personnel on site and the actions to take if such personnel discovered. When not in use, equipment is to be shut down and isolated. Hazardous materials are to be stored in locked store, if applicable, when not in use. Emergency communications to be established between operational personnel and site security. Emergency response plan both on and off site established / tested.	**Very Low** Management Action should prevent this happening,	**Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly
010	Spillages and Leaks as a result from vehicle related accidents	Flow by gravity; Air – Vapours carried on the wind.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Wellsite is to be constructed with a 2mm HDPE impermeable liner at a slight decline to ensure rainwater and pollutants are captured within the containment system (Tertiary Containment). Storage Tanks shall be placed within a secondary containment bund or shall be double bunded units. Vehicles to be serviced and maintained to manufacturer's / industry standards. Regular maintenance and inspections to be conducted as directed by the manufacturer / written procedures. Site / vehicle spillage kits to be readily available. Spillages to be remediated immediately using vacuum cleaners / pumps and not to be washed down where possible. Record and investigate complaints, pollution incidents or breaches of permit conditions and the actions taken to rectify complaints and prevent further occurrences. Emergency response plan established / tested.	**Very Low** Management Action should prevent this happening,	**Low** Impact is unlikely to exceed the site boundary.	**Not Significant** If Managed Correctly

DISCHARGES TO SURFACE WATER

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Overflow of site perimeter during operational and non-operational activities.	Flow by gravity Percolation to the subsurface	Water Features Surrounding Land	Water produced and/or used within the activity is re-used where possible within the operation for well control, cementing operations, and drilling operations. Waste water is contained within the site boundary via storage tanks. Surface run-off water is contained within the impermeable liner and perimeter drainage system. Water within the sump may be recycled as fire water by the Fire and Rescue Service. Used fire water will be tested for contamination prior to being removed from site for onward disposal to an authorised licenced facility by an authorised licenced waste carrier. No discharge to surface water will take place. Surface water shall be managed by the operator and collected via a licenced carrier to a permitted licenced facility.	**Very Low** Management Action should prevent this happening,	**Very Low** Site is contained and no discharges will take place.	**Not Significant** If Managed Correctly

Assessment of Air Emissions Risk

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Greenhouse gas emissions from site power generation.	Air – Vapours carried on the wind. Atmosphere.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Generators are maintained and serviced in line with manufacturer's guidelines thus ensuring that they operate efficiently and minimising emissions, noise and vibration. Service and maintenance regimes are implemented and adhered to and all work is carried out by a competent trained electrician / mechanic. Generators supplied within the rig structure respond to power demand and the working load and output varies during the operations being conducted. When power is not required generators are switched off to reduce emissions, fuel usage, noise, vibration and wear and tear on the equipment. A detailed air quality assessment has been carried out and confirmed that the impact from the operations as being 'negligible' and 'insignificant'.	**Very Low** Not expected to impact the immediate or surrounding area.	**Very Low** Minute levels of CO_2 compared to global scale.	**Not Significant** If Managed Correctly
002	Greenhouse gas emissions from flaring of natural gas during operations.	Air – Vapours carried on the wind. Atmosphere.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Flare units designed and constructed to industry standards / best available techniques. Flare units to be of a shrouded and enclosed nature ensuring efficient combustion. Monitoring procedures established to include monitoring of the gas entering the flare. Flare units will be monitored during operation. Good phase separation upstream of flare to remove and prevent liquid carryover. Procedures established and communicated to operational personnel should the flow rate of gas exceed or fall below the flares flow range. A detailed air quality assessment has been carried out and confirmed that the impact from the operations as being 'negligible' and 'insignificant'.	**Very Low** Not expected to impact the immediate or surrounding area.	**Very Low** Minute levels of CO_2 compared to global scale.	**Not Significant** If Managed Correctly
003	Greenhouse gas emissions from vehicles and site equipment during operations.	Air – Vapours carried on the wind. Atmosphere.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Vehicle loads and transportation to be planned to reduce quantity of deliveries / collections. Vehicles are to be serviced and maintained to manufacturer's / industry standards. Regular maintenance and inspections are to be conducted as directed by written procedures. Vehicles when not in use to be switched off. A detailed air quality assessment has been carried out and confirmed that the impact from the operations as being 'negligible' and 'insignificant'.	**Very Low** Not expected to impact the immediate or surrounding area.	**Very Low** Minute levels of CO_2 compared to global scale.	**Not Significant** If Managed Correctly

Assessment of Disposal or Recovery of Waste Produced Onsite

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Waste Sand and Clays	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Very Low** Pollution involving non-hazardous solids along traffic route.	**Not Significant** If Managed Correctly
002	Fresh Water Drilling Muds	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Low** Pollution involving non-hazardous liquids along traffic route.	**Not Significant** If Managed Correctly
003	Bentonite Containing Drilling Muds	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Low** Pollution involving non-hazardous liquids along traffic route.	**Not Significant** If Managed Correctly
004	Chloride Containing Drilling Muds	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Low** Pollution involving non-hazardous liquids along traffic route.	**Not Significant** If Managed Correctly
005	Oil Based Drilling Muds	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Medium** Pollution involving hazardous liquids along traffic route.	**Low** If Managed Correctly
006	Fresh Water Based Cuttings	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Very Low** Pollution involving non-hazardous solids along traffic route.	**Not Significant** If Managed Correctly

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
007	Chloride Containing Drilling Muds	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Very Low** Pollution involving non-hazardous solids along traffic route.	**Not Significant** If Managed Correctly
008	Oil Based Drill Cuttings	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Low** Pollution involving hazardous solids along traffic route.	**Not Significant** If Managed Correctly
009	Well Suspension Brine	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Low** Pollution involving non-hazardous liquids along traffic route.	**Not Significant** If Managed Correctly
010	Spent Hydrochloric Acid	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Low** Pollution involving non-hazardous liquids along traffic route.	**Not Significant** If Managed Correctly
011	Formation Water	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Low** Pollution involving non-hazardous liquids along traffic route.	**Not Significant** If Managed Correctly
012	Formation Water (NORM)	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes. NORM (if present) is expected to be of a low concentration.	**Very Low** Management actions and procedures should prevent this happening.	**Medium** Pollution involving hazardous liquids along traffic route.	**Low** If Managed Correctly

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
013	Cement	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations.4Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Very Low** Pollution involving non-hazardous solids along traffic route.	**Not Significant** If Managed Correctly
014	Accommodation Waste Water and Sewage.	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Low** Pollution involving non-hazardous liquids along traffic route.	**Not Significant** If Managed Correctly
015	Surface Run-off Water.	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Low** Pollution involving non-hazardous liquids along traffic route.	**Not Significant** If Managed Correctly
016	Contaminated Surface Run-off Water.	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Hazardous contaminants expected to be minimal in concentration. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Medium** Pollution involving hazardous liquids along traffic route.	**Low** If Managed Correctly
017	Engine, Gear and Lubricating Oils from Mobile Plant.	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Hazardous contaminants expected to be minimal in volume. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Medium** Pollution involving hazardous liquids along traffic route.	**Low** If Managed Correctly
018	Hydraulic Oils from Mobile Plant.	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Hazardous contaminants expected to be minimal in volume. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Medium** Pollution involving hazardous liquids along traffic route.	**Low** If Managed Correctly

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
019	Oil Rags / Absorbents from Mobile Plant Maintenance.	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Hazardous contaminants expected to be minimal in volume. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Medium** Pollution involving hazardous liquids along traffic route.	**Low** If Managed Correctly
020	Waste Filters from Mobile Plant Maintenance	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Hazardous contaminants expected to be minimal in volume. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Medium** Pollution involving hazardous liquids along traffic route.	**Low** If Managed Correctly
021	Paper and Cardboard from Office routines	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Very Low** Pollution involving non-hazardous solids along traffic route.	**Not Significant** If Managed Correctly
022	Canteen Waste.	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Very Low** Pollution involving non-hazardous solids along traffic route.	**Not Significant** If Managed Correctly
023	Packaging from Delivered Products	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Very Low** Pollution involving non-hazardous solids along traffic route.	**Not Significant** If Managed Correctly
024	Metal from Engineering Works	Transportation from site by road to Licenced Waste Facility.	Along traffic route.	Non-Hazardous Waste Stream. Waste transportation from the site to the licenced waste facility is by a licenced waste carrier. A delegated person will be onsite during operations to ensure that handling, storage, documentation and onward disposal of generated wastes is in compliance with current regulations. Vehicles are to be serviced and maintained with storage containers checked for integrity. Vehicle spillage kits are to be carried during transportation of wastes. Vehicles are to adhere to approved traffic routes.	**Very Low** Management actions and procedures should prevent this happening.	**Very Low** Pollution involving non-hazardous solids along traffic route.	**Not Significant** If Managed Correctly

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
025	Natural Gas	Air – Prevailing winds from the south west.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Flare units to be agreed by Environment Agency to ensure compliance prior to use. Flare units to be considered Best Available Technique (BAT) or BAT Equivalent. Flare units to have a minimum combustion efficiency of 98%. Flare unit and associated pipework to be tested for leaks prior to operational use. Monitoring of flare combustion temperature to be undertaken during periods of flaring. Monitoring procedures established to include monitoring of the gas entering the flare. Good 3-phase separation upstream of flare to remove and prevent liquid carryover. Procedures established and communicated to operational personnel should the flow rate of gas exceed or fall below the flares flow range. An Air Quality Impact Assessment has been undertaken prior to commencement of flaring operations. Records will be kept of complaints and actions taken to resolve complaints where required.	**Very Low** No exposure expected or adequately dispersed prior to reaching receptors.	**Very Low** Nuisance – reduced / low visibility.	**Not Significant** If Managed Correctly

Global Warming Potential[2]

Serial No.	Activity	Substance	Chemical Formula	Atmospheric Lifetime (Years)	Global Warming Potential (GWP)	Direct / Indirect Release	Released Mass (Tonnes)	Global Warming Potential of Emissions (Released Mass x GWP)
001	Well Site Construction	Carbon Dioxide	CO_2	Variable	1	Direct	487	487
002		Methane	CH_4	12.4	28	Direct	0.54	15.12
003		Nitrous Oxide	N_2O	121	265	Direct	0.0137	3.6305
004	Drilling	Carbon Dioxide	CO_2	Variable	1	Direct	6,290	6,290
005		Methane	CH_4	12.4	28	Direct	7.31	204.68
006		Nitrous Oxide	N_2O	121	265	Direct	0.1765	46.7725
007	Well Testing (Appraisal)	Carbon Dioxide	CO_2	Variable	1	Direct	9,547	9,547
008		Methane	CH_4	12.4	28	Direct	8.72	244.16
009		Nitrous Oxide	N_2O	121	265	Direct	0.1735	45.9775
010	Sidetrack Drilling	Carbon Dioxide	CO_2	Variable	1	Direct	6,274	6,274
011		Methane	CH_4	12.4	28	Direct	7.28	203.84
012		Nitrous Oxide	N_2O	121	265	Direct	0.1761	46.6665
013	Maintenance / Workover	Carbon Dioxide	CO_2	Variable	1	Direct	333	333
014		Methane	CH_4	12.4	28	Direct	0.41	11.48
015		Nitrous Oxide	N_2O	121	265	Direct	0.0093	2.4645
016	Well Abandonment	Carbon Dioxide	CO_2	Variable	1	Direct	250	250
017		Methane	CH_4	12.4	28	Direct	0.30	8.4
018		Nitrous Oxide	N_2O	121	265	Direct	0.007	1.855
019	Well Site Restoration	Carbon Dioxide	CO_2	Variable	1	Direct	153	153
020		Methane	CH_4	12.4	28	Direct	0.20	5.6
021		Nitrous Oxide	N_2O	121	265	Direct	0.0043	1.1395
							Total GWP of Emissions tCO_2 equivalent	24,175.79

Energy Sources, Conversion Efficiency and Emission Factors

Serial No.	Energy Source	Location of Emission	Delivered to Primary Conversion Factor	CO_2 Factor (t/mwh, Primary)
001	Gas Oil	Direct	1	0.250

Energy Emission Factors

Serial No.	Fuel	MWh	Delivered to Primary Conversion Factor	t/MWh	Carbon Dioxide Emissions (MWh x Delivered to Primary Conversion Factor x t/MWh)
001	Gas Oil	24,850	1	0.250	24,850 x 1 x 0.250 = 6,212.5 Tonnes / 6,212,500 kg

[2] Based on the proposed development as a whole, sourced from Air Quality Assessment

Assessment of Global Warming Potential

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Greenhouse gas emissions from site power generation.	Air – Vapours carried on the wind. Atmosphere.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Generators are maintained and serviced in line with manufacturer's guidelines thus ensuring that they operate efficiently and minimising emissions, noise and vibration. Service and maintenance regimes are implemented and adhered to and all work is carried out by a competent trained electrician / mechanic. Generators supplied within the rig structure respond to power demand and the working load and output varies during the operations being conducted. When power is not required generators are switched off to reduce emissions, fuel usage, noise, vibration and wear and tear on the equipment. A detailed air quality assessment has been carried out and confirmed that the impact from the operations as being 'negligible' and 'insignificant'.	**Very Low** Not expected to impact the immediate or surrounding area.	**Very Low** Minute levels of CO_2 compared to global scale.	**Not Significant** If Managed Correctly
002	Greenhouse gas emissions from flaring of natural gas during operations.	Air – Vapours carried on the wind. Atmosphere.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Flare units designed and constructed to industry standards / best available techniques. Flare units to be of a shrouded and enclosed nature ensuring efficient combustion. Monitoring procedures established to include monitoring of the gas entering the flare. Flare units will be monitored during operation. Good phase separation upstream of flare to remove and prevent liquid carryover. Procedures established and communicated to operational personnel should the flow rate of gas exceed or fall below the flares flow range. A detailed air quality assessment has been carried out and confirmed that the impact from the operations as being 'negligible' and 'insignificant'.	**Very Low** Not expected to impact the immediate or surrounding area.	**Very Low** Minute levels of CO_2 compared to global scale.	**Not Significant** If Managed Correctly
003	Greenhouse gas emissions from vehicles and site equipment during operations.	Air – Vapours carried on the wind. Atmosphere.	RAMSAR, SAC, SPA, MPA, SSSI, SAM, Surface Water Features, Sensitive Receptors	Vehicle loads and transportation to be planned to reduce quantity of deliveries / collections. Vehicles are to be serviced and maintained to manufacturer's / industry standards. Regular maintenance and inspections are to be conducted as directed by written procedures. Vehicles when not in use to be switched off. A detailed air quality assessment has been carried out and confirmed that the impact from the operations as being 'negligible' and 'insignificant'.	**Very Low** Not expected to impact the immediate or surrounding area.	**Very Low** Minute levels of CO_2 compared to global scale.	**Not Significant** If Managed Correctly